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Wm Finney

# Dairying Exemplified,

OR

# The Buſineſs of Cheeſe-making:

Laid down from approved Rules, collected from the moſt experienced Dairy-Women, of ſeveral COUNTIES.

Digeſted under various Heads,

From a Series of Obſervations, during *Thirty Years* Practice in the CHEESE TRADE.

ALSO

The moſt approved method of making BUTTER.

LIKEWISE

A Diſſertation on APPLE TREES, or the Culture of the ORCHARD improved.

The nature of VEGETATION explained.

With ſome other Obſervations of great importance to HUSBANDRY.

by *J. TWAMLEY.*

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# PREFACE.

IF a Dedication, or Introduction to the following Work ſhould be thought neceſſary, I moſt humbly, and juſtly addreſs it to the excellent DAIRY-WOMEN of *Great Britain;* duly ſenſible, that from them I received the firſt hints that led me to the performance, and without whoſe aſſiſtance and encouragement, joined with my own knowledge and experience, I ſhould never have offer'd it to the Public.

The real deſign of this work, is to aſſiſt thoſe who are not fully acquainted with the moſt proper methods, neceſſary to be uſed in the management of a DAIRY; I have made it my endeavour to render every part as plain and intelligent as poſſible, and am in hopes upon a due Obſervation of the rules laid down many will find their account in it. It is my ſincere wiſh, that it may be a means of improving the quality, as well as enlarging the quantity of CHEESE, through the kingdom; and become extenſively uſeful to the community in general.

# Dairying Exemplified, &c.

IT has been the wonder of many People, who are intereſted in the Article of Cheeſe, either as Makers or Dealers; that no Treatiſe or Book of rules, or method of making Cheeſe, hath ever been attempted; or the buſineſs of it examined, ſo as to direct thoſe who are concerned as Dairy-women, or having the chief management in Dairys, to become proficient therein.

And from the great number of inferior Dairys there is, in compariſon to the few that are excellent in their kind, or even what are called good Dairys; which every perſon who is much concerned in the Cheeſe Trade, is well convinced of; and 'tis evident to a nice obſerver of the different, yea, very different qualities of Cheeſe produc'd in different Dairys, or even in the ſame Dairys, when either the Dairy-maid is changed, or the uſual method of Cheeſe making, by the Miſtreſs or manager of each Dairy, is not ſtrictly adhered to. A Remedy for this great deficiency is looked upon as an affair of great moment, eſpecially by thoſe, whoſe lot it is to be fixed in the Cheeſe Trade in a conſiderable Dairying Country, where large quantities of Cheeſe, are annually bought; and where, was Cheeſe-making in equal repute, or the real quality of Cheeſe, equal in goodneſs to ſome neighbouring Counties, a much larger quantity would certainly be made, and what would be a great encouragement both to the makers & buyers of it, a better price would be procured for the ſame Article, and a much readier Sale, than when of an inferior quality. Beſides which, it is very clear that many People do not, for want of a proper method, make near ſo much Cheeſe, from the ſame quantity of Milk, as others do; or as even themſelves might do, if a more proper method was purſued. Theſe conſiderations, having always been clearly apparent, have from time to time, and as oft as an opportunity of attaining any knowledge, in the buſineſs of making good Cheeſe hath offered;

led the Author of the following Treatiſe, to collect, weigh, & inveſtigate every particular circumſtance leading to improve the ſaid art, or buſineſs, as hath enabled him from time to time, to aſſiſt, and help many, by his advice and directions, to rectify and amend many faults, and deficiencies, in the method they followed; and many have by ſuch directions greatly improved their Dairys. And from conſtant experience and ſeeing the improvements, and the effects produced from every different method practiſed or explained, by ſuch as he found moſt experienced, or beſt informed; for the ſpace of Thirty Years and upwards, he never fail'd to avail himſelf; this hath conſtantly led him to ſcrutinize into the real cauſe, of every impediment, or fault, in the method of making Cheeſe, from the firſt ſtep, or Milking the Cows, to the compleating or removing the Cheeſe for Sale. And to point out a remedy to each complaint upon rational principles, as far as they appear to him; and are confirmed by the opinion of others, who have been in the way of making obſervations of the ſame nature, and who give encouragement to the Author to make ſuch improvements Public for the general good. I am well acquainted, how unthankful an office it is, to attempt to inſtruct or inform Dairywomen, how to improve their method, or point out rules, which are different from their own, or what hath always been practiſed by their Mothers, to whom they are often very partial, as having been the beſt of Dairy-women, and even, when they have imperceptably alter'd their method, by ſhortening the time in gathering the Cheeſe, which is a term generally given for collecting the Curd at the bottom of the Tub or Pan, after the runnet or rendleſs has done its duty, or by putting a larger quantity of runnet into the Milk to haſten the coming of the Cheeſe, which alteration, though often not obſerved by the Dairy-maid, or Miſtreſs, is of very material importance, and is what I ſhall endeavour to explain, in as conciſe a manner as poſſible. I doubt not, the ſame reflection will occur to the minds of ſome few on reading my Book; as hath often done upon occaſion, when I have in a Dairy met with any particular impediment in their Cheeſe, which the Dairy-woman would fairly acknowledge ſhe could not ac-account for, and had tried every means ſhe could think of to rectify; ſaying, what does he know of Dairying or how ſhould a Man know any thing of Cheeſe making?

But let theſe remember, that I have had frequent opportunities, of conſulting the beſt of Dairy-women, in many Counties, who I knew from experience did know how to make good Cheeſe, and in order to have it in my power to inform ſuch as did not know how, I have taken great pains, to inform myſelf, as many now living, in both ſituations can teſtify.

The principal faults that cauſe theſe difficulties to Dairy-women are, Hove Cheeſe, Spongey, full of Eyes, Whey Springs, Jointed or Shook Cheeſe, Split Cheeſe, Looſe Cheeſe, or Cheeſe made of unſettled Curd, Rank or Strong Cheeſe, Flying out or Bulging at the Edges, Dry-cracks or Huſky Coated Cheeſe, Bliſtering in the Coat, Blue Pared, or Decayed Cheeſe, Sweet or Funkey

Cheeſe, and ſometimes ill Smelling Cheeſe from tainted Mawſkins, from diſtemper'd Cattle, or ſome other cauſe, which by a ſtrict obſerver may be accounted for. Before a certain cure can be found out or applied, you muſt be acquainted with the nature, and cauſe of the complaint, or if by any accident, you hit upon a remedy, it may perhaps be a partial one, or ſuch as will not anſwer at all times, or in all Dairys, by reaſon the complaint is from a certain fixt cauſe, and which cauſe will at all times and in all places produce that effect; when perhaps, the remedy apply'd may only be proper in ſome particular Dairys, owing to Herbage, very rich Paſture, or very Poor, to Clover ground, or ground given to Noxious Weeds, Plants, or Trees, which the Cows eat of; each of which if not known or conſidered will produce a different effect, ſome of which effects may be ſimilar in appearance to complaints in other Dairys produced from different cauſes, the knowledge of which will be of great uſe, to every Dairy-woman, or maker of Cheeſe to know, as the operation, of the work, or management & care of the Cheeſe when made, muſt neceſſarily fall to their lot.

What relates to Paſturage, or the quality of Land for Graſs, the produce of the Land regarding Plants, Weeds, or Graſs of different kinds, falls more immediately under the eye or care of the Maſter, or Farmer of the Land; and from obſerving from time to time, the ſtate of the Dairy, the Taſte of the Cheeſe ſo far as it may be affected by any particular Herb, Weed or Graſs; the ſituation of the Cheeſe in the Dairy Chamber, how it is affected in different Seaſons, by Heat, Cold, Damp or Dry Weather, to know what are the cauſes of many general faults, or complaints in Cheeſe ſuch as Heaving, Splitting, Jointing, Whey Springs, Ill Formed, or Sweet Cheeſe, which often, when any of theſe happen in a Dairy, are produced by one general cauſe, and frequently go through the principal part of it, proceeding from the ſame neglect or miſmanagement. Theſe difficulties or deficiencies, it is proper a Maſter ſhould be acquainted with, as it often, I may ſay, too often happens, the Miſtreſs leaves the care of the Dairy to Servants, eſpecially the putting together the Milk, preparing the Runnet and putting it into the Milk, the ſtanding of the Milk till it becomes Curd, and breaking or gathering it after it is come; which is generally done by ſome common rule or method they have been uſed to, the method uſed by a former Miſtreſs perhaps, who might be eſteem'd a good Dairy-woman, and very likely undertook the management of the Dairy herſelf; or at leaſt ſo far as the eſſential part of the work extended; paying a particular regard to the time of the operation of the Runnet, in bringing the Cheeſe, or of gathering the Curd, fixing, or ſetting it after it is come; each of which require a minute exactneſs, and the principal error, or misfortune in Cheeſe making, is owing to theſe operations being too haſtily performed, not giving time enough for the different effects to take place; for if due regard is paid to making good Curd, you will very eaſily make good Cheeſe; few people in any buſineſs make good Goods of bad Materials, tho' many of the moſt ignorant, when provided with good Materials, prepared for their purpoſe, will finiſh them in a Workman-like and Maſterly manner; ſo will many a Dairy-maid, make very handſome Cheeſe and take care of it, till it comes to be very good, and ſo as to give credit to the ſeller, as well as the vender of it, that has no conſiſtent idea how the Runnet operates, or perhaps of the different ſtates of the Curd, in its various ſtages, or even when it is in a proper ſtate to begin the part of the work which uſually falls to her ſhare, of Breaking, Vatting, and preparing it for putting in the Preſs, which former part ſhould be the care of the Miſtreſs, or at leaſt of ſome Perſon who does underſtand it, to prepare the Curd for them. The buſineſs of a Dairy, is of conſiderable importance, and what is in ſome Places, half, or nearly the whole income, or produce of a Farm. The difference is ſo great between a very good Dairy-woman, an inferior one, and a very bad one, as would ſurpriſe, even a judicious obſerver, and the preceeding obſervations, which are what have happened in my own walks, will ſtrike conviction on the minds of many, who have never applied their thoughts to the Theory of Dairying. The general way that the art of Dairying has been carried on for Ages, has been progreſſive, or traditional, being taught by Mother to Daughter, from common and continual experience; naturally adopting from time to time, the methods that appear'd beſt, from ſuch as have happened to come within their own knowledge; without ever calling in the aſſiſtance of either Philoſophy, by which they might learn the different qualities, and effect of materials they uſe, or knowledge, how to apply them in a Phyſical, or Practical manner. And although the Author of this Treatiſe, is very conſcious how ſmall a ſhare of true Wiſdom falls to his Lot; yet has great hopes that from the deſire of making himſelf uſeful to community, with the aſſiſtance of reaſon and common ſenſe, he ſhall be able to render ſome aſſiſtance, to thoſe he wiſhes to ſerve. A kind providence hath provided for all our wants; Nature, as Nature, is compleat in all its parts; we, often in trying to improve it, diſtort, or throw it into confuſion; our

Ideas being inadequate to the attempt. Where nature points out, or leaves any open for improvement, in the uſe of any of the common neceſſarys of Life, it is the duty of individuals to take the hint, to weigh, inveſtigate and explain them for Public good. The preſent Syſtem of Dairying, being in a very imperfect ſtate, I am in hopes, my endeavours to render ſervice and improvement, will not be found unneceſſary.

A Cow, may I think juſtly be ſtiled, the moſt uſeful of all Animals, in regard to Man; Milk is a ſupport to our Infancy, and greatly contributes both to our comfort and ſupport through Life, not only ſupplying our preſent wants, by that ſalubrious aliment, but our future wants not only at home, but abroad; by the Cheeſe and Butter produced from it, it ſupplies us, even with many luxuries in our taſte, is a great ſupport to weakly conſtitutions by its Veal, as well as a great ſupport in the Article of Proviſions; theſe are its Bleſſings afforded when alive; when Dead, is to us the grand ſtamina of our Food, Beef, being the moſt nouriſhing and agreeable repaſt; it not only ſupports us at home, but ſupplies our Fleets, our Armies, our Garriſons and Iſlands all over the World; its Leather, ſo uſeful for Shoes, for Implements of Huſbandry, for Travelling, and for innumerable Conveniences; its Hair for our Buildings and other purpoſes, its Tallow for our Light at Home and Abroad, its Horns and Hoofs, and even its very Bones for our Implements, and various Materials of Trade. Were all its excellencies enumerated, they would be very extenſive.

Milk, muſt be allowed one of its moſt uſeful productions; it is given for our uſe in a pure, wholeſome, and nutritive ſtate; capable of improvements, or alterations, of its nature, according to our different wants. In the Article of Cheeſe, and Butter, a great deal depends on the Art, Judgment, Care and Diligence of the Performer, and the good or bad qualities of each, chiefly depend on the ſkill and induſtry of the Dairywoman. On a judicious obſervation you will find, that Milk is generally found even at different Seaſons, to be of a regular & equal ſtamina, or quality, & in the ſame manner effected by different fluxings; by Salts, Liquids, Sprits, &c. at all times; the buſineſs of Cheeſe making, is a regular and conſtant proceeding, practiced perpetually, every Day, time immemorial; and it ſeems ſtrange, that when the ingredients you employ are ſo few, and their nature alſo ſo exceeding, regular, and certain, that there can be much difficulty, in producing the Article of Cheeſe pure, and compleat; but daily experience convinces us, that there is amazing difference in the goodneſs of Cheeſe, inſomuch that you can ſcarce find two Dairys that are exactly, or even very much alike; it does not occur to the knowledge of every one what that difference is, but to a Perſon who deals largely in it, and makes obſervations upon it, muſt plainly appear; and though ſo few have ever attempted to ſcrutinize the nature of Cheeſe, or particularly of Cheeſe making, in a manner that yields conviction to its improvements; yet there is no reaſon, why that uſeful branch of knowledge cannot, or may not, be clearly explained.

The buſineſs has been in the hands of the Women hitherto, except in *Cheſhire*, *Wilts*, ſome part of *Glouceſterſhire*, &c. where a large quantity of Cheeſe is made, a Man is employ'd as an aſſiſtant, the weight of a large *Cheſhire* Cheeſe, being too great to be wrought by a Woman, and turning, rubbing, waſhing, and cleaning, is more than one Man can eaſily perform; 'tis common in large Dairys, to meet with Cheeſes, Eighty, one Hundred, one Hundred and Twenty, or even one Hundred and Forty pounds a Cheeſe, which requires conſiderable ſtrength to manage. In ſome part of *North-Wiltſhire*, I am informed there are Dairys that make Twenty-five Tons in a Year; and ſome few more than that. A Gentleman told me, that being lately at *Bath*, he was informed of a Perſon within leſs then Twenty Miles, who milk'd 200 Cows: Which led his curioſity to take a ride to ſee it, being a conſiderable Factor, who had frequent opportunity of buying Dairys of

Four, Five, or Six Tons each; but had never met with any Dairy of that extent. On hearing the recital of it, led me to the ſame thought as would naturally ſtrike him, *viz.* what ſort of a Houſe or Premiſſes the Perſon muſt have to cure, ſpread or diſpoſe of ſuch a quantity of Cheeſe, to get it ready for Sale? When he came to the Place, he found the report was true, but then he milked theſe 200 Cows at three different Houſes, in number proportionable to the convenience or ſituation of the Place. We often hear talk of *Cheſhire* Dairys of 100 Cows each, which the largeneſs of the Cheeſe in a great meaſure accounts for. But what are called large Dairys in *Warwickſhire*, *Leiceſterſhire*, *Staffordſhire*, or *Derbyſhire*, is from 20 to 40 Cows each; in theſe parts, from general obſervations I have made, each Dairy may produce annually on an average three Hundred Weight of Cheeſe from each Cow, taking the Dairys in general. I am inclined to think more Dairys produce leſs than that quantity, than there are that produce more; but this is obſervable, much the greater number of Dairys, are on Tillable, or Arable Farms, where new Graſs is introduced, which is always allowed to make leſs Cheeſe than good old Turf; and the proportion of up-land Farms, is much greater than of low-land. I have weighed many times Four Hundred from a Cow, and ſome few Dairys which have produced Five Hundred from each Cow; but then in ſcrutinizing into the affair, it has been attended with particular circumſtances, ſuch as being ſituate, in an excellent Graſs Country, where Meadows of dry Old Turf have been the Paſture, where clear ſtreams of running Water have gone through the Meadows, affording always good Beverage for the Cows, as well as a cool retreat for them in Hot Weather; by which means their Milk was kept in a temperate ſtate, while Cows on up-lands, perhaps, ſcorched with heat, and not having the nouriſhing Stream to go to, or ſhade to protect them from the Sun, cauſed their gadding, or running about to ſuch a degree, as prevented the increaſe of their Milk, in any proportion to what the running Stream produced; and throw'd the

Cows into ſuch a heat and diſorder, that their Milk would not yield near the quantity of Curd, and cauſed many difficulties in making the Cheeſe (which the cooler Dairys were not expoſed to, eſpecially, when under the hand of an unſkilful Dairy-woman,) likewiſe, in theſe prolific Dairys; the owner made a point of never keeping a Cow that was too old Milcht, or Milk'd too long from the time of Calving, or when any Cow went off her Milk either by any accident, or otherwiſe; then he always replaced her with a new Milcht one, either drying the old Milcht one for feeding or diſpoſing of her. That ſo the Dairy by that means was kept in full vigour through the Graſs Seaſon. The number of theſe Dairys is ſo very few and rare, they can only at moſt ſhow the World what may be done. I have been told by a *Wiltſhire* Factor, that the Land in their principal Dairy Country, is ſo Rich and Good that it is not very uncommon there for prime Dairys to yield five Hundred of Cheeſe from a Cow; but then there is every Advantage in their Favour; ſuch as (I believe no body who judgeth from the goodneſs of the Cheeſe, but muſt allow) the beſt of Dairy-women, who have been regularly bred to it from their Childhood, it generally being almoſt the ſole employ of the Farm, and thoſe Dairy-women led on by the greateſt and moſt powerful emulation, of ſelling for the higheſt Price. Their Cheeſe being generally ſold, retail, at a penny, and often two-pence per Pound, more than good Cheeſe in common. Their Cheeſe, that is made in the prime of the Seaſon, generally known in the country by the name of *Marlborough* Cheeſe, being much brought to Fairs by *Marlborough* Factors, or People reſiding not far from thence. Or in *London*, by the name of *North-Wiltſhire* Cheeſe, which always bears the greateſt Price of any Dairys, except thoſe of *Glouceſterſhire*; which, even the fineſt of *Barclay Hundred*, do not come up to; and I believe by many judicious People are even allowed to excel. Likewiſe in many very principal Dairys, they have this great Advantage; where Gentlemen in ſome places, occupying a large tract of Ground or Lordſhip, either themſelves, Stewards,

Baliiff,

Bailiff, or ſome other Perſon for them Stock the whole or chief Part with milking Cows, which they are very particular to get to come in, or calve, by the Time Graſs is in Vigour. Then theſe Dairy People agree with them for the Milk of ſuch a number of Cows, at a given Price *per* Week, as they can manage. The Gentleman, Bailiff, *&c.* engaging, that if any Cow fails in her Milk before a given Time, that he will take her away and replace her with a new Milcht one, by which means their Dairys are always in full Power all Summer; and then they engage for the Winter Dairy, at a Price proportioned to the ſtate of the Cows, either new, or old Milcht, by which means they are certainly enabled to make a larger quantity of Cheeſe than any common Dairy, or Land of inferior kind without theſe Advantages. And in many Dairys they make Cheeſe all the Year, as the quantity of Winter Cheeſe, and Fodder Cheeſe ſent to *London* Markets clearly ſhews.----Much depends on the ſituation of Dairy-ground, being nearer, or farther from the Houſe, where the Cheeſe is made; as Cows being driven any conſiderable diſtance to be Milked, cauſeth the Milk to Heat in their Udders in Summer-time; Milking them in the Field and carrying the Milk on Horſeback in Churns, or Barrels to much Diſtance, I take to be ſtill worſe, as that perpetually diſturbs the Milk, inclining it to the nature of Churning Cream for Butter, and the operation performed upon it, is quite of a different Nature, as it is for a different purpoſe or Deſign, and if Milk is put in a violent Motion by carrying, it makes it in ſome degree partake of the nature of Churning, inſomuch, that you often obſerve round the Bung, Plug, or Stopple of the Churn, a Froth or Scum, work out by force of Air, or Motion in carrying, that very nearly partakes of the nature of Butter, which plainly ſhews that the Body of Milk, cannot be in a proper State to make Cheeſe with, as the nature of Butter is produced by violent Motion, and the making of Cheeſe from a ſtate of Reſt, being directly oppoſite. I take it that oftentimes in very Hot Weather, the Milk in a Cow's Udder, much agitated by driving, or running about, is in a ſtate not very far different from that carried in a Churn, which frequently makes the great difficulty in what is called bringing the Cheeſe, or fixing the Curd in the Tub, or Pan; I have often heard Dairy-women ſay that tis ſometimes very difficult to make it come at all, and inſtead of one Hour, ( the Time very commonly given by Dairy-women, in bringing the Cheeſe,) that it will frequently not come in Three, Four, or Five Hours; and then in ſuch an imperfect State, as to be ſcarce capable of being confined either in the Cheeſe-Vat or Preſs, and when releaſed from the Preſs, will heave, or puff up, by Splitting or Jointing, according as the Nature or State of the Curd happens to be. Whenever People find their Cows in this ſituation which in Hot Summer Evenings muſt often happen, eſpecially, where Water is ſcarce, or in Grounds where there is very little Shade; then it is, that making uſe of a little cold Spring Water before earning, or rendling, is uſeful; as that will make the Runnet take effect and the Milk co-agulate much ſooner. It often happens, in ſome Dairys, that the Work is quite at a ſtand, the Dairy-woman not knowing how to haſten the Co-agulum, or coming of the Cheeſe, thinks of putting more Runnet in, to forward it; but the Nature of Runnet being ſuch, as will diſolve the Curd, in part co-agulated, if more is put in, diſturbs the whole, and prevents its becoming Curd at all, or, in a very imperfect State, remaining in the Whey, in an undigeſted State that will neither turn to Curd or Cream, and a principal part of the richeſt of the Milk is then caſt away with the Whey. Cold Water, with a little Salt, (as hereafter recommended) will in a great meaſure prevent this difficulty. One great Point, or Thing to be obſerved, in firſt ſetting off, or rendling the Milk, is carefully to obſerve the ſtate of the Milk, as to Heat or Cold; the grand medium, or ſtate it ſhould be in when you put the Runnet into it, is what may be properly underſtood, Milk-warm; if you find it to be warmer than that, it is recommended, to put ſome freſh Spring Water into it, in ſuch Quantity, as will reduce it to the Milk-warm State; a Quart, Two, Three, Four or more according to the quantity of Milk to be ſo cooled; many People may think Water will hurt the Milk or impoveriſh the Cheeſe; experience ſhews it will not, but is a means of the Runnet more immediately ſtriking or operating with the Milk. I would recommend the uſe of a Thermometer, to ſhew the degree of Heat Milk bears. I doubt not one may be conſtructed on a very eaſy Plan, that will coſt a very little Money, and it will be very well worth while to be at a ſmall Charge, to regulate a fault, of putting Milk together too Hot, which is of more ill conſequence than People are aware of. The ſame uſe holds good in putting Milk together for Butter; it is obſerved, that Milk being ſet up too Hot, will not throw up Cream near ſo well, as when in a temperate State, and cauſes it ſooner to turn Sour. *

As ſoon as the Milk is reduced to a proper warmth, and before you put the Runnet

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* By the Term Milk-warm, is not commonly underſtood, the Warmth that it has on coming from the Cow, as that varies according to the Heat of the Body of the Cow, at the Time of Milking, but a Warmth, a few Degrees removed from Coolneſs; a Degree of Warmth, in general well underſtood.

net to it. it is an exceeding good way to put a handful or two of Salt into the Milk, or three or four handfuls if your quantity is large ( I recommend about two handfuls to ten or twelve Cow's Milk; ) this will alſo cauſe the Runnet to Work quick, and giving a Saltneſs to the whole, will be a means of preventing Sweet, or Funkey Cheeſe, as it will make the Cheeſe all Salt a like, be a means to prevent Slip Curd, or Slippery Curd, make the Curd ſink in the Tub more readily, and equally.* If your Milk is too Cold, let ſome Milk be warmed and put into it, to bring it to the ſtate of Milk-Warm, obſerving not to warm a ſmall quantity to make it boil, as boiling alters the nature of Milk in ſome degree; ſcalding Heat is thought to ſet the Curd, making it Tough, that it is judged beſt, to warm a tolerable good quantity of Milk pretty warm, that it will give Warmth to the whole in a ſufficient degree. Sometimes you will find in Cold Weather, your

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* Your Cheeſe will afterwards want a leſs quantity of Salt, than if none had been put in the Milk; enough to ſettle it, and make it firm in the Preſs, will be ſufficient.

Milk in the time of earning, get Chill; I have known in ſuch a caſe, a Perſon take a Tea Kettle of Hot Water and put into it, with ſucceſs; let it be when the Curd is nearly, or pretty well come, as then the Hot Water will give a Toughneſs to the Curd, to relieve it from the ſlippery nature it had acquired by being Chill, and that Chilneſs continuing to encreaſe, it is with difficulty you can bring your Cheeſe into a regular or fixed ſtate. It is a very common way with many Dairy-women to allow the Milk to ſtand an Hour, in earning, or after the Runnet is put in, before it is gather'd, or ſunk; many I fear content themſelves with thinking it ſufficiently come in leſs time, *But here* lies the greateſt miſchief in Cheeſe-making; the Milk is very often diſturbed before its proper time, and ſometimes when the whole is in a ſtate of Slip Curd, or Slippery Curd, which is a ſtate all Curd is in, before it becomes ſolid Curd, or Curd, fit to make Cheeſe with. You are always to obſerve that the ſtate in which it is when you firſt ſtir or diſturb it, in that ſtate the Curd will remain; it never improves as Curd, or becomes

comes better Curd after it is diſturbed or removed from its ſtate of reſt.

You will generally obſerve, that when you ſink the Curd in the Tub, even when it is in a tolerable good ſtate, as many imagine, there will bits of Slip Curd ſwim about in the Whey and not ſink with the reſt, till the Whey is laden from it. That ſlip Curd will not adhere to, or join with the ſolid Curd, & though ever ſo well broke or ſeperated, yet in whatever ſtate it is, when the Cheeſe is made, it all diſſolves, or melts; if a bit as big as a Nut happens together, it diſſolves into a Whey Spring, runs out, and leaves a Hole in the Cheeſe, which always decays in that place; if a bit as big as a Pins-head happens, it diſſolves, and leaves an Eye in its place, and that is the cauſe of Eyes in Cheeſe; if you cut the Cheeſe when young, you will find, that there is a Moiſture, or Wet, in every Place where the Eye is, after it is dried up, which Wet or Moiſture is called Tears. *

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* This term, Tears, plainly indicates, that it has been uſually underſtood in this light, being the Tears of the Eye.

When a large quantity of ſlip Curd is in a Cheeſe tis a long Time before it becomes hard, appearing always looſe within; which, when the Cheeſe is dry, on cutting, it appears like a Honey-comb.

The thing that more Dairy-women err in, then any other, is gathering or ſinking the Cheeſe too ſoon. The rendling of Cheeſe, cauſeth a very great Fermentation; there muſt be time given for the fixt Air in Cheeſe, or Curd, ſet to work by the Runnet, to diſſipate, expand or fly off. The Runnet is a thing ſo powerful in its effect, as to have no ſubſtitute yet found that can be uſed in its place; all Fermentations remove or ſeparate the fixed Air, from the different Bodies they are connected with.

The effect of Runnet on Milk is very great, and in order to thoroughly fix the Curd, it muſt have ſufficient Time to work, concrete, or congeal the Curd into a ſolid Maſs by extirpating the Air from it; if you remove or diſturb the Milk before its full Time, yet the Runnet having begun its operation, though you do not give it Time to work, by reaſon of hurrying it forward, yet when it is again at reſt, ſuch Air as hath not been ſeparated, by breaking, ſqueezing or preſſing, will extend itſelf, and the Air will find a vent, or expand itſelf into a greater compaſs than it was before confined in; and whether it is in the Preſs, or after it comes out of the Preſs, will find a way to diſcharge itſelf; many times to that degree, when in the Preſs, as to even burſt the Cheeſe-cloth it is wrapt in, if it is ſo confined that it cannot eſcape by it. If it does not get diſcharged otherways, then, as ſoon as the Preſs is let up, it will ſhatter the Cheeſe within to a ſurprizing Degree, and immediately cauſe the Cheeſe to heave, or puff up, even in that State, which ſo ſeparates the Curd in the Cheeſe, as it ſeldom ſettles again, unleſs taken quite in Time, or before the Curd is connected in the Preſs. A good way to prevent this diſorder, of what is called Cheeſe heaving in the Preſs, from taking a bad effect, which complaint generally happens when the Milk is put together too hot, and the Whey that comes from it is left white (which it ought never to be, for then you may be ſure all is not right); when the Cheeſe has firſt been in the Preſs an Hour or more, let the Preſs up and if you find the Cheeſe ſwell, or bliſter, take a large Needle, or fine Skewer, of Wood or Iron, & pierce it in many places to let the Air out; a Pin is not ſo well, as Braſs taints the Cheeſe, and it will appear of a tainted braſſy colour ever after: If you find when the Cheeſe comes again out of the Preſs, that it ſtill ſwells, or bliſters, apply the Needle again, and it may perhaps ſettle again ſo as to make a uſeful Cheeſe; it will never be a good one, but will remain in the ſtate called looſe Cheeſe or ſhook Cheeſe. Thus you may diſcern ſome-what of the nature of ſlip Curd; every Dairy-woman ſhould take Care to become as well informed of the different properties, its Nature, cauſe of its Formation, and manner of operating as poſſible, in order thereby to avoid the many difficulties proceeding from it, which are more numerous than all others, in the whole ſyſtem of Cheeſe-making put together, and have been by them, the leaſt conſidered and examined. In order to avoid many difficulties, and render you complete Miſtreſs of the firſt part of the Work, which is a very material Criſis, take Care to be well informed of the nature of Maw-ſkin, or Runnet-ſkin; it is very proper every Dairy-woman ſhould know how to prepare them for uſe, which is very eaſily acquired, to know in what manner or to what degree it ſhould be ſalted, and how, properly dried, and take particular care that you have the Maw freſh, not in a tainted or putrid State, and if ever you do happen to have ſuch a misfortune as to have it damaged either by neglect, as to Time of preparing it, great heat of Weather, which ſometimes hurts our beſt and freſheſt Meat in a ſurprizing degree, notwithſtanding every Care or caution taken to prevent it, or by the Skin having any way taken Wet, or being Fly-blown; to many of which mishaps the moſt careful Perſon, is ſometimes expoſed; any of which quite alter the Nature of it; being of a more particular conſtruction than any other thing, which muſt appear plain, when tis conſidered, that you cannot ſubſtitute or apply any one Thing, in the Article of making Cheeſe to a proper effect, or that will anſwer your purpoſe of extracting Curd from Milk in order to make Cheeſe of, but Maw-ſkin; and you will find that when the Skin is damaged or tainted, it looſes its fermenting quality conſiderably; that it will either not take Effect at all, or in a very partial and ſlow degree, and you will often find Cheeſe made from tainted Maw-ſkin appear of a putrid, unſettled, ill-taſted, diſcoloured Nature, being affected in a different Manner, according to the degree of Putrifaction the Maw-ſkin has received. Sometimes I have perceived the Cheeſe of a duſky black Colour, not fixt in its Texture, or become ſolid and cloſe; ſometimes, in Taſte reſembling the flavour of tainted Beef or Mutton, when it comes to your Table; ſometimes it has the ſmell of rotten or addled Eggs, ſometimes of the moſt inſipid or taſteleſs Nature, which on enquiring into the cauſe, could never be explained to me by the Maker. Sometimes an ingenious, well-diſpoſed Perſon, who wiſhed for Improvement or to become acquainted with the nature or conſequence of ſuch complaint, would hint to me, her fear was, the Maw-ſkin was damaged; tho' I have had ſome, who inſtead of being open to Conviction, or that would pay any regard either to my Opinion or Advice, would tell me that could not be the cauſe, for they always prepared their own Maw-ſkins, and no one could be more careful to cure them properly, which was the reaſon they always avoided buying Skins as much as poſſible, for fear of that misfortune. All this care and precaution I doubt not was juſt, as from the great care many People take of their Dairy in every reſpect, would be particularly cautious about their Maw-ſkins; but let themſelves judge, whether ſome of the afore recited cauſes, might not happen to their beſt endeavours. When I have come to a place where the Dairy-woman has informed me ſhe has been deceived in her Maw-ſkins, being then I thought on ſure Ground, or certainty of the Cauſe, I have been very careful to become acquainted with the real nature of the ill effects produced in conſequence thereof, and have always found ſome of the Evils before-mentioned, and could often judge from the State I found the Cheeſe in, in what manner, or to what degree it was affected thereby, and even ſo as often to convince the Maker of it, that my Opinion was Right. If at any Time this Misfortune is Apparent to you, that ſome neglect, or miſhap has taken Place in curing your Maw-ſkins, you will eaſily gueſs from which of the above Cauſes they ſpring; and perhaps in a courſe of Time, you may become well convinced, that every one of theſe miſchances do ſometimes happen, and as you muſt certainly be a better, or more competent Judge of the real nature of the complaints, (than any other Perſon can be from common obſervation,) you will moſt likely, find other cauſes of damage, or misfortune that happens in the proceſs, more then I have enumerated; and if any material one, it would be exceeding uſeful to have it made Public, for the benefit of Society, or to warn thoſe of the damage, whoſe Buſineſs it is to ſupply the Market with Skins for Sale. When you perceive any of your Skins have miſcarried, that they are either tainted, or otherways damaged, take particular notice how they appear; in what reſpect they differ from perfect Skins, knowing, that the like cauſes produce ſimilar effects, and then if you are obliged to buy Skins, you will be enabled to avoid buying ſuch as have the Faults you are acquainted with. I have often been led, when in a Shop where Maw-ſkins were on Sale, to examine them ſomewhat minutely, and could perceive in ſome of them much difference; I have ſeen in the ſame Skin ſometimes, the appearance of very different qualities; I have obſerved diſ-coloured Spots on holding it up to the Light; I have ſeen one part of a Skin of a well-coloured ſound nature, another Part that had ſomewhat the look of rough Parchment, or hard Whit-leather; on ſmelling, it has not appeared of the ſame nature, or reliſh, with the reſt; I have alſo obſerved Skins that have appeared quite tainted, and even in a decaying State, and have ſeen Rendleſs after being made, appear of a duſky blackiſh Colour. A Dairy-woman ſhould be acquainted with theſe complaints, in order to avoid the difficulty that inevitably accrues for want of that Knowledge,

ledge, and ſhould frequently taſte the Runnet when made, that ſhe may find out in Time if there is any thing diſagreeable attends it.

The Maw-ſkin, or bag of the Abomaſus, is the Maw or Stomach of Calves, that have fed on nothing but Milk, and are killed before the digeſtion is perfected, it contains an Acid Juice called Runnet, Rennet, or Earning, with which Milk is co-agulated, or rendered into Curd for making Cheeſe; in the Maw the Chyle is formed, that causes this co-agulum; but it greatly looſes this effect, when Calves have fed on Vegetable Food; the Maw of Houſe-Lamb, I am informed will anſwer the ſame purpoſe, but not of Graſs Lamb. I have heard of a perſon who Salted the Curd, or Crudity that was found in the Maw at the Time the Calf was killed, prepared as the Maw-ſkin is, with good effect, only uſed in a larger quantity. This may eaſily be tried by way of experiment; I never heard of but one Perſon who uſed it, and ſhe is now dead; that prevented my enquiry about it. It is obſervable as an old Maxim, that although Runnet readily co-agulates Milk, yet if put in when already co-agulated, it diſſolves it.

There are many ways of making, or preparing Maw-ſkins; the beſt and moſt approved I ever met with is, as ſoon as your Maw is got cold, when taken from the Calf (for tis known that ſalting Meat hot, in ſultry Weather, will make it Taint,) let it be a little ſwilled in Water; ſome People ſay tis better not to be clean'd at all, and the effect will be greater, it coming nearer to real nature, and the reaſon given, is this, 'tis the inſide of the Maw that has the effect in Runnet, and the chyle proceeding from it, the outſide being little otherwiſe than any other Entrail. Rub the Maw well with Salt, then fill it, and afterwards cover it with Salt; ſome cut them open and ſpread them in Salt, one over another in layers, and let them continue in the Brine they produce, ſometimes ſtiring, or turning them, for four, ſix, or nine Months, as they can ſpare them, then open them to dry, being ſtretched out with Sticks or Splints, that they may dry regularly; when they are dry they may be uſed; though, tis reckon'd beſt to be a Year Old before uſed, keeping them one Year under another. Dont let them in drying, be too near a Fire; if heated too much, renders them liable to reeze, (as Bacon will, when melted by heat,) and hurts their quality, giving them a rancid taſte; many People think, the Brine they are prepared in, very uſeful in making your Runnet, putting it amongſt it as other Brine, with ſmaller proportion of Runnet. People differ in their way of preparing Runnet or Rendleſs. Many will make it with Whey; ſome will put in with the Whey, the Brine drippings that come from the Cheeſe when in the Preſs. Both theſe I quit diſapprove; Whey having already undergone purgation, Fermentation, or ſeparation of the Curd from Milk, is more likely to become viſcid, or gummy, acrid, or ſharp, or liable to putrifaction then a more pure element. Brine drippings are of a groſs foul nature, and may be deem'd, (if the expreſſion may be allowed) even the very excrements of Cheeſe-making, and what ought never to be put in, in order to bring the Cheeſe, cauſing a rank and foul Smell as well as Taſte, I take it to be the worſt of all diſagreeables.

The way moſt approved by good Dairy-women, or ſuch as have fallen within my knowledge is this; take pure Spring Water, in quantity proportion'd to the Runnet you intend to make; it is thought beſt by ſome, about two Skins to a Gallon of Water; boil the Water, which makes it ſofter or more pure, make it with Salt into Brine that will ſwim an Egg, then let it ſtand till the heat is gone off, to about the heat of Blood warm, then put your Maw-ſkin in, either cut in pieces or whole; the former I ſhould imagine beſt or moſt convenient; letting it ſteep for twenty-four Hours, or two Meals, ( ſo called in Dairying ) and it is fit for uſe, putting ſuch a quantity into your Milk as you judge neceſſary, for rendling your quantity of Milk into Curd; obſerving that too much Runnet makes the Cheeſe ſtrong and liable to heave, and is what many People call, taſtes of the Bull, or Bull Cheeſe ( eſpecially when Brine drippings are put in.) Too little Runnet makes it very Mild, and muſt have more time to ſtand, before its broke, or ſunk: The judgment required, in the quantity of Runnet, to be uſed muſt be regulated by your own prudence, increaſing or leſſening it as you find it neceſſary; 'tis often reckon'd, about a Tea-cup full, to ten Cows' Milk. If you make a quantity of Runnet together to keep, for uſe, let the ſame method be uſed, increaſing the quantity of each Material to what you want, puting it in Jars or Bottles, till you want it.

A very material circumſtance to be attended to in Cheeſe-making, is the time allow'd for the Cheeſe coming, or from the time allow'd for the Runnet to take effect, or the time when the Milk is at reſt, called earning time.* Which ſhould on no account be leſs than an hour and half; all that is ſtirred, gather'd, or ſunk, in leſs time is liable to danger. It may happen, and often does, that it will come ſooner, eſpecially when the method I have recommended of putting Salt in the Milk is uſed, and where

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* Synonimous Terms.

care is taken to have the Milk of a proper warmth, as in theſe caſes the Curd co-agulates or collects ſooner on that account; I believe it will be found that the additional time given will never be of any bad conſequence, as the Curd then gets firm, and on ſinking, becomes more ſolid, and is eaſier made into Cheeſe, in leſs time, and with much leſs trouble, than when ſtirred or broke ſooner. What is called ſunk Cheeſe is always allowed to be the fatteſt; when Curd is fully ſet, or fixed of a ſolid nature, by having time enough, it will incline to ſink to the bottom of the Tub, by the aſſiſtance of the Hand to gently Preſs it down, gather, or collect it, and will ſoon become of a ſolid nature; moſt People break the Curd, by ſtirring it round ſeveral times with the Bowl, in order that it may be collected together. Sinking, is performed by getting it down, or ſinking with the Hand, without breaking.

In order to prevent a difficulty in getting the Whey to ſeperate eaſily when ſinking the Curd, you may prepare a long Cheeſe Knife made with a Lath, one edge being ſharpened to cut the Curd a croſs from top to bottom, in the Tub, three or four different times croſſing the lines, checkerwiſe, by which means the Whey riſes through the vacancies made by the Knife, and the Curd ſinks with much more eaſe. I have alſo known a ſieve uſed to facilitate or haſten the Curd ſinking, with Succeſs, as it gives an opportunity to lade off the Whey clear from Curd, gets the Curd down much eaſier and ſaves Time.

When all the Curd is got firm at the bottom of the Tub, by preſſure of the Hand, let all the Whey be taken from it; then let it ſtand one quarter of an Hour for the Curd to ſettle, drain, and get ſolid, before you break it into the Vat; if any bits of ſlip Curd happen to be ſwimming in the Whey, that does not ſink with the reſt, it had better be put away with the Whey, than put to the Cheeſe, as it will not cement or join with the ſolid Curd, and all ſlip Curd, as before obſerved, diſſolves or melts, ſo that it is a detriment to Cheeſe when ever put in; many People, as ſoon as the Whey is removed, immediately break the Curd ſmall as poſſible, and then put it into the Cheeſe Vat, for finiſhing. I would always recommend that it reſt one quarter of an Hour, before 'its broke, or vatted; the Cheeſe would be much better for it, as the Air would more eaſily ſeparate, and prevent its puffing up under your hand, when ſqueezing in the Vat, and alſo prevent the Fat ſqueezing out, as it often does through your Fingers; which being ſo much broke, occaſions, and certainly it muſt make your Cheeſe, both leaner and lighter. I have conſulted many good Dairy-women, on the Article of breaking Cheeſe, and find, tis the moſt general Method to break the Curd as ſmall as poſſible, when put into the Vat; but what makes that more abſolutely neceſſary, is, there being ſlip Curd amongſt it, and that never appears to embody, or join with the reſt, unleſs broke and thoroughly mixed; and even then I am fully convinced is of no uſe for the reaſon above given; although I have laid it down as a rule, never to ſtir or gather the Cheeſe in leſs then an Hour and half, many of the beſt Dairy-women I have ever conſulted, generally let it ſtand two Hours; by which Time the Curd is got to be of ſo firm a nature, as to render the breaking of it at all abſolutely needleſs; it being got ſo ſolid, they only cut it in ſlices, put it into the Vat and work it well into it, by ſqueezing thoroughly to make it firm and cloſe, then put it into the Preſs, and no more is needful. The fineſt, fatteſt and beſt Cheeſe I have ſeen, I have been informed was made this way; there is ſure to be no ſweet Cheeſe, horny-coated, or jointed Cheeſe made in this manner; many Dairy-women are much puzzled concerning the cauſe of ſweet Cheeſe, forming different Ideas about it; I am fully convinced it is wholly cauſed by ſtirring or breaking it too ſoon in the Tub, by which means the Runnet has never taken full effect, nor is any Slip-Curd ever fit to make Cheeſe with, in what ever ſtate it may appear, unleſs in ſoft Cheeſe, or ſlip-coat Cheeſe. When the Whey is of a white colour the Curd is not fully ſettled, & if it is ſo to any great degree, the Cheeſe is ſure to be ſweet, and in that caſe you are ſure to caſt away great part of what ſhould be Cheeſe, for the Whey thus put away would neither turn to Butter nor Cheeſe, though of a conſiderable ſubſtance, remaining of an undigeſted nature; If you purſue the method I have laid down, you will always find the Whey quite green, which is the colour it ought to be of; and let more or leſs be the Time you adopt to put your Cheeſe together, if the Whey is not green, depend upon it your Cheeſe is not properly come, or your Maw-ſkin is not good, or quantity of Runnet not ſufficient; it is difficult to aſſertain what quantity of Runnet is required to bring a Cheeſe in the moſt proper manner, as the quality of the Skin is ſo various, and ſtrength of Runnet, as well as quality of Milk ſo different; people are much divided in opinion, whether 'tis the beſt way to make your Runnet freſh every Day, or to prepare a quantity together, according to the quantity you want and bottle it up for uſe; in large Dairy's it muſt be beſt to make a quantity together, as you certainly muſt be a better judge of the quality, or what quantity is neceſſary, than when the making is left to chance, as by that means you may regulate the quality and taſte of your Cheeſe better, and have more dependance on the time of its coming.

The beſt Dairy-women I have known, in general recommend the latter Method.

The cauſe of jointing or wind-ſhook Cheeſe, is from a ſmall quantity of Slip-Curd being much broke, ſo as not ſufficient, to form Eyes in the Cheeſe; but which is ſufficient when diſſolved through the whole maſs, to leave a vacancy, which generally unites in a perpendicular direction, and forming cracks or joints within the Cheeſe and ſinking joints nearly like to cracks on the outſide. If it happens to any conſiderable degree, it cauſes the Cheeſe to have very little Taſte, generally turns blue if pared whilſt under a year old, and often rotten Cheeſe when older; moſt dry-rotten Cheeſe is produced from this effect, unleſs when bruiſes, or cracks are the cauſe. Wet, or moiſt rotten is generally produced by a larger quantity of Slip-Curd; having never united in a ſolid ſtate, nor taken any Salt, becomes very putrid and rots, and as the Cheeſe diſſolves, is often very wet or moiſt. I have ſeveral times ſeen Cheeſe that has appeared ſound till cut, that afterwards had not a pound of ſound Cheeſe in a whole one. Spungy Cheeſe is ſuch as partakes of the elaſtic or ſpringing quality of a Spunge, I take it to be produced from Curd, which has nearly undergone every proper Fermentation to make the Curd unite, but leaves it in a very tough ſtate, cauſed by the over heat of the Milk when put together. Rank, or ſtrong Cheeſe is generally cauſed by too great a quantity of Runnet, and that Runnet made too ſtrong to operate in the Time given. Hove, or heaved Cheeſe is cauſed by different means; when the quantity of Air in Cheeſe increaſes after the Cheeſe has been ſome Time made, I ſuppoſe ſuch Air to be rarified by a greater Heat than the Cheeſe has before been in, the coat being got hard and the pores much cloſed, the Air expands within, and cauſes the Cheeſe to riſe or ſwell, in a round form; this is very viſible when you put a Taſter into the Cheeſe or a Pin to let out the Air, it ruſheth forth with a ſtrong Wind, of a rank diſagreeable ſmell, cauſed by the Air being diſcharged from putrid or undigeſted Curd. Sometimes, if Cheeſe is laid cool when firſt made, or coming from the Preſs, is dried outwardly by means of a harſh cool Air, when at the ſame Time the inſide of the Cheeſe remains in a moiſt ſtate, though the Coat is hard and dry, when that Cheeſe is expoſed to heat, either by lying near a hot Wall, or near Tiles in hot Weather, or by the immediate heat of the Sun, it will be drawn up, round, in the ſame manner, and by the ſame cauſe that a board is made round or cofferd up, by the heat of the Sun; rank Cheeſe very often heaves, from the cauſe before given that makes it rank, Cheeſe is very apt to ſplit, or divide in the middle, by being ſalted within, eſpecially, when people ſpread ſalt acroſs the middle of the Cheeſe when the vat is about half filled, which Curd tho' in a ſmall degree ſeperated by ſalt, never cloſes, or joins, and is much eaſier coffer'd up or drawn round than other Cheeſe; eſpecially, thin Cheeſe made in what we call *Glocester* vats being round or riſing in the bottom, and the ſlider or Cheeſe-board that is laid over it, made convex alſo, in order to make the

Cheeſe thinneſt in the middle, that it may dry quick for early ſale. Then, if ſalted within and being laid ſoft on the ſhelf to dry, as it bears only on the edge all round, it is almoſt ſure to ſplit; and it is often ſeen, ſcarce a Cheeſe in ſome Dairys of this form but what do ſplit; ſalting a little in the Milk is greatly preferable, for theſe Dairys in particular; for as ſalt diſſolves, it keeps the inſide of the Cheeſe moiſt or ſoft for ſome-time; if ſalted in the Curd, which is what I would never recommend to be done in any Dairy, eſpecially in the middle as is often done. I have ſometimes known, Cheeſe thus ſalted when there has been much Slip-Curd in it, and that, and the Salt both diſſolving together, and the Cheeſe ſplit, the vacancy ſhall contain a quantity of Water, which if Ironed when Young, guſhes out, or elſe cracks the Cheeſe when moved, and the Water runs out to a conſiderable degree, the ſame thing muſt have been obſerved by other Factors, in ſome Dairys where ſalting in the middle is uſed. Cheeſe is apt to bulge, fly-out, or get round edged, when it is either kept ſoft, by being moiſt within, or having too much Slip-Curd or unſettled Curd, or elaſtic Air within it. Dry cracks, or wind cracks are generally produced, by keeping Curd from one meal to another which gets quite cold & fixed, & being put together with Curd that is made of too hot Milk, theſe two, never properly adhere, or join, and cauſe the coat to be harſh, and often fly, or crack, curdly or wrinkle-coated Cheeſe is cauſed by Sour Milk, chiefly when Cheeſe is made from two meals, as 'tis very common in hot Weather for Milk to turn, or get ſour in one night's time, eſpecially if Milk is hot when ſet up, having been much heated in the Cow's Udder, and very probably much agitated and diſturbed by Cows running about, or being heated to a violent degree, or the Milk having been carried in Churns or Barrels on Horſe-back any diſtance; Cheeſe made of cold Milk eſpecially if inclined to be ſour, is apt to cut chiſelly, or that breaks or flies before the Knife. Sunk-coated Cheeſe is cauſed by being made too cold, as you will often find Cheeſe that is made in Winter or late in Autumn, will be, unleſs laid in a warm

Room after it is made. Two-meal Cheeſe is made with two meals, or night and mornings Milk, which if put together pure, not having the Cream taken off, will make nearly as good Cheeſe as New-Milk, and much better if it muſt be finiſhed in one Hour, or leſs, or when New-Milk Cheeſe is made with Milk that is too hot.

What is generally known by the name of Two-meal Cheeſe, is in *Glouceſterſhire* called Second Cheeſe, being made from one meal New Milk and one of old, or ſkimmed Milk, having the Cream taken away. Skimmed Cheeſe, or Flet-Milk Cheeſe is made from all ſkimmed Milk, the Cream having been taken off the whole to make Butter, or for other purpoſes: This ſort of Cheeſe is much made in the County of *Suffolk*, or at leaſt goes by the name of *Suffolk* Cheeſe, when at market, or in *London*, where the principal part of it is diſpoſed of; it being much uſed on ſhip-board, not being ſo much affected by the heat of the ſhip as richer Cheeſe, or ſo ſubject to decay in long Voyages, and being bought at a low Price, makes it much called for in that way. There is but little art required in making this Cheeſe, if care is taken of it, but yet there is great difference in the quality of it, which I am fully convinced is principally cauſed by want of care. It is not expoſed to ſo many difficulties as richer Cheeſe, but Dairy-women muſt remember, Slip-curd has the ſame effect, in a leſſer degree in Skim-Cheeſe as in New-Milk; though the Milk being much weaker is not in ſo much danger. An Hour, or an Hour and a Quarter is time enough to give it in rendling; keep it warm when young and cool after. I know ſome Dairy-women do not give it three quarters of an Hour in coming, and thereby find more difficulty than need be; paying little regard to it, as they do not uſe it themſelves, nor will it fetch much money, yet I know ſome careful Dairy-women who make Skim-cheeſe that would deceive a common obſerver, in appearance, being made in the ſame form as New-Milk Cheeſe, well coloured, made clean, and better coated than many ordinary Dairys of New-Milk Cheeſe.

I have paid in a Dairy of thirty Cows upwards of ſixty Pounds in a Year for Skim-Cheeſe, an object not unworthy a Dairy-man's notice, ſome people are of opinion, the moſt Money to be made of the Skim-Milk of a Dairy, is to feed Sows and Pigs with it, but this I muſt leave to thoſe concerned in the Buſineſs. Some Dairy-women in order to enrich their New-Milk Cheeſe will put the Whey-Cream, into their Milk, which if quite freſh, not older than one or two Meals, will improve it. To make fine Cream-Cheeſe, one meal of Cream extraordinay ſhould be added to the New-Milk; this will make exceeding Rich-Cheeſe, but requires great care, and ſhould not be gathered or ſunk in leſs than two Hours. I apprehend two Hours and a Half or three Hours will be found much better in general.

The way to make ſoft Cheeſe, or ſlip-coat Cheeſe, is, take ſix quarts of new Milk hot from the Cow; the ſtroakings or laſt milkings are the beſt, being the richeſt Milk; put into it two ſpoonfuls of Runnet, let it ſtand three quarters of an hour, or till it is hard, coming, or become full Curd; lay it into the Vat with a ſpoon, not breaking it at all, laying upon it a trencher, or flat board; preſs it with a four pound weight, or if you find it gets too hard, then preſs it with a lighter weight, turning it with a dry cloth once an hour, and when got ſtiff, ſhift it every day into freſh graſs or ruſhes; it will be fit to cut in ten or fourteen days, or ſooner, if the weather be warm; many people uſe Baſkets, made on purpoſe inſtead of Vats to make it in, this is eſteemed in private Families, where it is carried to market, Vats muſt be beſt, unleſs carried in the Baſkets.

To make brick bat Cheeſe, in *September;* take two gallons of new Milk, and a quart of good Cream; warm the Cream, put in two or three ſpoonfuls of Runnet, when it is well come, break it a little, then put it into a wooden mould in the ſhape of a brick, preſs it a little, then dry it; it is beſt to be half a Year old before it is uſed, or more, if you like it older; two hours is as little as it ought to be in earning, or to ſtand before it is broke after the Runnet is put in, or longer if the Whey is not inclined to be green.

Cream Cheeſe is generally made in *Autumn*, the Milk being richer and fatter in *Auguſt* and *September;* by which means it has not the warm Seaſon to ripen it, and it is generally made thick, in order to preſerve it's mellowneſs. Rich Cheeſe will not dry ſo faſt as lean, nor thick Cheeſe ſo ſoon as thin; in courſe it muſt get leſs hard in the Seaſon than common thin Cheeſe, by which means it is more expoſed to froſt and chilling cold. I have often found that people who make Cream Cheeſe, find more caſualty attend them, than in leaner, hard Cheeſe, owing to chillneſs, or being froze before they get hard; for when froſt gets much into Cheeſe, it deſtroys every good quality, and makes it putrify, and become either inſipid, or ill taſted; Cream Cheeſe ſhould always be kept in a warm ſituation, and be particularly guarded from froſt, and till it has ſweat well, or you loſe will the advantage of its richneſs. The contrary method is to be uſed with ſkim Cheeſe, as in that there is very little fat to ſweat out, and chill Cheeſe is better than harſh-meated, horny-coated Cheeſe; let it have what warmth you can for about a fortnight after making, and then keep it cool.

In making ſlip-coat or ſoft Cheeſe, remember it is of quite a contrary nature to hard Cheeſe; and inſtead of getting ſtiff, its beſt quality is to have it run, or diſſolve into a creamy ſubſtance; for which reaſon it muſt be made with Slip-Curd, which alone will cauſe it ſo to do; good Curd will always get harder by drying, but Slip-Curd will not even become Solid, or continue a Subſtance; this clearly demonſtrates my Sentiments on Slip-Curd as before related. It has generally been reckoned that the Milk required to make one Pound of Butter will make two Pounds of Cheeſe, and a larger quantity where Land is poor, the Milk being weak will not afford ſo much Cream.

As colouring of Cheeſe is now become almoſt an univerſal practice, it is highly neceſſary to pay a due regard thereto; Cheeſe, in its native ſtate, that is well Manufactured, being put together in proper Time, the Milk of proper warmth, well cleaned when young, and kept Warm, till being regularly Dry, will naturally be of a yellow caſt, and when a Year old will coat of a reddiſh or brown-red colour; the richer the Cheeſe, the more tis inclined to appear in this manner, and you ſeldom meet with Cheeſe of this native caſt but what is exceeding good, being Fat, well-taſted, cuts flaky, is ſtout, or full-taſted, high-flavoured Cheeſe; and it is found that every country will produce ſome ſuch Cheeſe, when in the hands of ſkilful Dairy-folks, though it has yet appeared in a ſmall degree; you will find ſuch Cheeſe among the fine Dairys in *Cheſhire*, *Double-Glouceſter*, or *Thick-Glouceſter*, being made double the Thickneſs of common Cheeſe, *North-Wilts*, in ſome few Dairys. in *Derby*, *Stafford*, *Leiceſter*, and *Warwickſhires*, but there being ſo ſmall a proportion of this beſt Cheeſe, and the demand for it being larger than the ſupply, a ſubſtitute is thought neceſſary, to make good Cheeſe look as much like fine Cheeſe as poſſible; from which cauſe the art of colouring originates, and much increaſes.

It is remarked by dealers in Cheeſe as well as others, that a much greater part of the People that eat Cheeſe, have little Idea how it is produced; they, finding the beſt Cheeſe of the fulleſt, or yellow colour, naturally conclude, or are led to think, that Cheeſe of a pale colour, muſt be made with inferior (or ſkimmed) Milk. So much this Idea prevails, that it is well known, in *London*, a Cheeſe-monger will more readily ſell good Cheeſe of a full colour than fine Cheeſe of a pale or inferior colour; *London* being the principal Market, or place where the greateſt quantity of the beſt Cheeſe is ſold. Colouring formerly uſed to be performed by various Drugs, as *Turmerick*, *Sanders*, &c, by *Marigolds*, *Hawthorn-buds*, and the like. The principal ingredient now uſed is *Annatto*, and in its beſt kind, is much the beſt colouring that ever was found out. *Annat-*

*to* is of two ſorts, known by the name of *Spaniſh-Annatto* and *Flag-Annatto*, the former is much the beſt for Cheeſe-colouring; being of a hard ſubſtance, and proper in kind, or texture, diſpenſing its colour in a regular and free manner, without being ſubject to much waſte or decay. The *Flag-Annatto* is brought over in a moiſt ſtate, and wrapped in large broad Flags, which keeps it in ſome degree from waſte; it is brought in that ſtate chiefly for the Dyers uſe, and is a principal Article in Dying Orange-colour; if this ſort is uſed in colouring Cheeſe before it gets hard, it is apt to appear in the Milk of an oily nature which prevents the colour taking effect in a regular manner, and is ſome detriment to the coming of Cheeſe; if it is kept till quite dry and hard, which in courſe of Time it will be, perhaps in ſix, nine, or twelve Months, it is then very little inferior to *Spaniſh*. Of this laſt ingredient, mixt with others, the Druggiſts and Blue-makers in *London*, make large quantities of what they call Cheeſe-colouring, often giving it the name of *Spaniſh-Annatto*, and there is ſome of it made, to very much reſemble it, both in nature, and colour. But true *Spaniſh-Annatto* is much preferable; I have known an ounce of it colour ten hundred weight of Cheeſe, of a much better colour than any other ingredient would that I ever knew; I have known it formerly ſold in ſhops at three ſhillings, and four ſhillings *per* ounce; the great price it then brought at market, and getting very much into uſe, induced the *American* planters, at one time, to ſend a large quantity, which ſo much over-ſtocked the market, and lowered the price, that it was not worth their while to make it; and for that reaſon, very little of the genuine ſort has come to *England* ſince; but the ſame materials have come in flags, which come at a much lower price, though nearly as dear in the end, being ſo much heavier, and the colour not going ſo far as the *Spaniſh*, nor is the colour ſo exquiſite or blooming as the *Spaniſh*; that, giving the Cheeſe the bloom of native yellow Butter, when made in the prime ſeaſon of Spring. An ill opinion having been formed of coloured Cheeſe, and by many ſaid that it is unwholſome, in order to remove that prejudice, I will endeavour to deſcribe its nature. It is made from the ſeed of a plant, of the flowering kind, much like to a balſam, the ſeed is ſo much like it, as ſcarce to be diſtinguiſhed from it; I have ſowed it, but without effect, our Climate being too Cold. I was ſometime ſince enquiring of a *Jamaica* Planter, how the *Annatto* was prepared for uſe; who ſaid when the Seed was ripe it was covered with a ſlimy or unctuous ſkin like as Linſeed is, which being ſteeped a little while in water, became looſe from the Seed and was rubbed off with a cloth or flannel, which being afterwards waſhed with water, was ſunk to the bottom; on pouring the water off, the *Annatto* was produced in a wet pulp, or paſte, which being wrapped in flags, was ready for Dyers uſe.

In the *Spaniſh Iſlands*, they dry it and make it up in balls for uſe, and tis a principal ingredient in lacquering braſs, *&c.* as well as colouring Cheeſe. I am well convinced that in its pure ſtate, it is of a very rich fattening nature, and improves Cheeſe to a great degree, in quality, as well as colour, as I never met with any Cheeſe ſo exquiſite, that had not been coloured with it, as I have of that which hath. The way it is uſed in colouring Cheeſe, is, take a piece of *Spaniſh-Annatto*, which appears in form of a ſtone, then take a bowl of Milk, dip the *Annatto* a little into it, then take a pebble, or hard Rag-ſtone, on which rub the *Wet-Annatto*, waſhing off the *Annatto* into the bowl, till it becomes of a deep colour, then put that into the tub, or pan of Milk you make Cheeſe of, (before you put in the Runnet or Salt) in ſuch quantity as will render the whole of a pale Orange-colour, which will get deeper, or increaſe in colour after the Cheeſe is made; one good property *Annatto* partakes of, it neither affects the Cheeſe, in taſte or ſmell. Cheeſe is often impregnated with Sage, by bruiſing the leaves and mixing the juice with Milk, which gives it a green colour, and an agreeable taſte. Some uſe Parſley in the ſame manner, but that is not ſo much eſteemed for flavour as Sage, Marigold-flowers are bruiſed and uſed the ſame way; theſe flowers are reckoned of a very fattening nature and good flavour, and eſteemed the moſt of any, and give the Cheeſe a colour nearly equal to *Annatto*. Cochineal is alſo uſed by the curious, being of a fine pink hue, and has a pretty effect, in the hand of an ingenious Dairy-woman, in making figures of Flowers, Trees, *&c.* in Cheeſe.

Dairy-women who are fully of opinion, that no better method can be uſed, than that which they apply, are not often very readily convinced, that there are better methods of making Cheeſe than theirs. A Factor who is a good judge of Cheeſe, ſees a great variety in the quality of Cheeſe, and altho' moſt People like good Cheeſe, yet ſo eaſily is the difference diſcerned by nice judges, who have frequent opportunities of remarking it, that they can perceive a real and diſtinguiſhing property, that cauſes a very different Idea in them, from what they hear advanced by the makers. Such a dealer is very certain, that in a large connexion of trade, he will find ſome very good judges, who know how to prefer excellence in quality, and are well acquainted with the perfections required in the article, and perhaps from their ſituation in life, are enabled to get a much higher than a common Market-price, for a ſuperior Article: Such a Perſon will have ſuch goods, in what place ſoever they can be met with, & knows alſo that in order to procure them he muſt give a ſuperior Price.

A Perſon who engages to ſupply ſuch cuſtomers, as ſuch there are in perhaps every country, in a larger or leſſer degree, muſt uſe his own judgment, and not depend on the good opinion others may form of their goods. He will find in a very large ſurvey, amongſt Dairys, in the beſt country he travels, a very ſmall proportion of excellent Dairys, or ſuch as will ſupply thoſe particular cuſtomers, and when he meets with them, is perhaps, obliged to deal them out very ſparingly to the different good cuſtomers, that they may all wiſh to have ſome particular nice, and good Cheeſe for ſuch of their Friends; who are likewiſe determined to have the very beſt they can meet with, very good ſecond-rate Cheeſe, is much more ſcarce than inferior, and the beſt, will ſtill find cuſtomers. Every dealer would be happy to find a large ſupply of fine Cheeſe, every maker of Cheeſe would be glad to have his Dairy meet with that preference. Some Dairy-folks will complain that there is not proper encouragement for making good Cheeſe; as Factors give for all Dairys in a neighbourhood, nearly the ſame Price, though ſome of theſe Dairys are not ſo good as others, by ſome ſhillings *per* hundred: But then let theſe people remember, that 'tis themſelves only that ſit in judgment in this caſe. Bring the makers of two Dairys together, and you will hear each of them give the preference to their own. The Factor muſt clear himſelf of this charge! For tis of dangerous conſequence, for a Factor to complain of any fault in the Cheeſe to the maker, or not give it ſufficient praiſe.---Perhaps he will ſay to the Perſon, whoſe Dairy may appear the neateſt, and have had moſt care taken of it, and in the Eye of moſt people, had the preference, your Cheeſe is extremely neat and good, is fat and mild, and will pleaſe many of our beſt cuſtomers exceedingly, will even ſtand in competition with *Glouceſter* and *Wiltſhire* Cheeſe, which is always neat, well-handled, and moſtly eſteemed by genteel People, your neighbour's Cheeſe is not ſo mild or beautiful, but has many good qualities, 'tis full flavoured, ſtout Cheeſe, ſuch as is moſt in demand, is bought by people who do not ſo much mind the beauty of it, as being profitable Cheeſe to buy, that will ſpend well, or according to the common Phraſe, will eat Bread well, and though there may be a few ſtrong Cheeſes amongſt them, there are many cuſtomers wiſh to have them ſo. If you go into a Fair, you will find ſome people looking for handſome mild Cheeſe, but more buyers of ſtout, good ſpending Cheeſe, of which they muſt be better judges, what ſuits their ſale, than the makers.---Certainly there are in moſt Countries, ſome few Dairys that have all the good qualities, beautiful, fat, fine flavoured, *&c.* and theſe generally find their way to the beſt market. There is one beſt way of doing every thing, and 'tis what in every way of life is a cauſe of ſtrife, a maxim I was taught in my youth was, never ſtrive to be ſecond-beſt, ſome one muſt prevail, and they that do muſt ſtrive for it, the beſt way of doing a thing is as eaſy, when known, as the ſecond-beſt. This emulation is what every dealer in Cheeſe would wiſh to diſcover in the breaſt, and proceedings, of the different Dairy-folks in his walk, that he might be enabled to go to market, as one, who could lead and command both the opinion & intereſt of the beſt cuſtomers: Such goods as would give that preference to him, would of courſe give the command in price to thoſe who ſupplied him; for though the Cheeſe they now make, may at preſent ſupport their own good opinion, yet, when they come to find, that they have improved in ſo great a degree, as to enable them to ſee excellence, where they only ſaw uſefulneſs & blooming beauty, where only mediocrity appeared. Ambition & Intereſt, their boſom friends, will point out a new road to them, in which they will travel, not only as ſwift & proſperous, as their rival neighbours, but will not leave them in an eaſy & compoſed ſtate, till they have out gone them. In this happy track I confeſs I ſhould be glad to meet many of my old friends & neighbours, in whoſe ſervice I have laboured many a long day; and ſo far as my abilities will ſupport me, ſhould be glad to be their conductor; but whether in my preſent purſuit, I may be ſo happy as to ſhew them the right road is very uncertain. If by opening their Ideas afreſh, ſhewing them where Improvements may be looked for, and giving them ſome convincing circumſtances, where ſuch truths appear, they may be led to look farther to find better, I ſhall hope they are in a fair way to prevail. Some few circumſtances they perhaps may expect, to convince, and ſome freſh out-lines to extend the Ideas I have ſet on float. I will give you in a few inſtances, the way I came firſt to be moved in this purſuit.

The firſt that alarmed my Ideas, concerning the cauſe of ſweet, unſettled and ill-flavoured Cheeſe was, I was once going by a houſe, I knew was notorious for as bad a Dairy as I ever met with, the Dairy-woman ſaw me, and ſaid, wont you call and look at my Cheeſe, I am ſure tis as good as my neighbour T---s, which you have been buying; I replied I fear not; come in then and ſee, ſhe ſaid; as ſoon as I came into the Dairy-chamber, I ſaw, and told her it would not ſuit me; why not, ſhe replied, I am ſure tis every drop New-Milk, and nobody can take more pains with it, nor work harder at it than I do. On looking to the farther ſide of the room, I perceived a Cheeſe that was very blooming in appearance, handſome in ſhape, well-coated, firm, fat, and much larger than the reſt. I ſaid, pray how came that Cheeſe there---I ſhould be glad to know the Hiſtory of it; why truly ſaid ſhe tis a ſtrange one. I replied if you will make ſuch Cheeſe as that, it would be worth five ſhillings, or even ten ſhillings a hundred weight, more than the reſt; ſays ſhe, one night when I had rendled my Milk, a perſon came running to me, and ſaid, neighbour T--- is groaning & you muſt come immediately; I ſaid to a raw wench I had to help me, now be ſure you dont touch this Cheeſe till I come back, I will be ſure to come to you when I ſee how neighbour T--- is; but it happened ſhe was worſe than I expected, and I could not leave her till after midnight. I ſaid, my Cheeſe will be ſpoiled, but the poor Woman ſhall not be loſt for a

Cheeſe; when I came home I found it not ſo bad as I expected, put it into the Vat in a hurry, ſaying, it may poſſibly make a Cheeſe that will do for ourſelves, but I little thought it would ever be a ſaleable Cheeſe,----well now----ſaid I, and is not this Cheeſe a proper leſſon to you? dont you thereby plainly ſee that you have made the reſt too quick---why yes---ſaid ſhe, it might, if I had thought at all---but I declare, I never once thought about it---Profound ſtupidity! thought I to myſelf, and left her---however, this plainly convinced me that Cheeſe in general was made too much in a hurry, and often when I came to a Dairy where the ſame complaint prevailed, I told them this ſtory, and it frequently had the good effect, to produce good Cheeſe in the lieu of bad.

To corroborate with this ſtory alſo, my own opinion, that good Cheeſe may be made by a good Dairy-woman in any place, or on any land; there now lives in the ſame farm, where this old woman did, a perſon who makes, without exception, as good a the firſt meals, and at each meal after---- ſhe followed my advice preciſely, the Milk being at reſt before I left the houſe. Some time after, I enquired of her how my advice ſucceded; ſhe ſaid, quit well, and I am convinced we had not made half the Cheeſe we ought to have done. But obſerved, their Pigs had been found to thrive in a ſurprizing manner, and well they might, after having had more then half the produce of the Dairy.

I once met with a young Dairy-woman at a Fair; who had a lot of Cheeſe unſold, after almoſt every Dairy in the Yard it ſtood in was diſpoſed of; ſhe aſked me to buy her Cheeſe, having bought ſome adjoining Dairys; I objected, ſaying I do not like it, ſhe ſeemed rather ſurpriz'd, ſaying I am ſure 'tis made of as good Milk and as well took care of as any of my neighbours that you have bought, I told her the method ſhe took in making the Cheeſe was wrong, ſhe ſeemed quit deſirous to improve it if ſhe knew how. I deſired her to follow the method deſcribed above, exactly, which ſhe promiſed to do, but obſerved it was ſo contrary to what ſhe had ever heard of, ſhe ſhould be ſurprized if it made good Cheeſe. I ſaid the Cheeſe you have here is very bad, the way to make good Cheeſe muſt be contrary to that in which this was made, for the like reaſon as when a perſon is in a burning fever, cooling medicines are applied to reſtore him; when very chill a warming remedy will have effect---ſhe wiſh'd to know what were the faults of her Cheeſe; I told her it was very looſe, ſweet or ill-taſted; that rather diſpleaſed her, and ſhe ſeemed to miſtruſt my knowing any thing of the matter---ſaying--it is not ſweet---how can you poſſibly know that never taſted it, I told her Cheeſe of that countenance always was ſweet. I put my taſter into one and gave it her to taſte, ſhe acknowledged it was very rank, but wondered how I could know it was ſo---I perceived the Cheeſe of an unſettled nature, that I had not a doubt the Milk had been carried in Churns or Barrels, I ſaid I imagine your Dairy-ground is ſome diſtance from your Houſe, do you milk your Cows in the field or drive them home, ſhe ſaid ſometimes the latter, but generally the former, and brought the Milk home on horſe-back. I told her how difficult it was to make good Cheeſe of Milk carried in that way; ſhe ſaid I find you know where I live, I replied I dont know ſo much as the County you live in, ſhe ſeemed quite aſtoniſh'd; I ſaw a huſky dry coated Cheeſe on the top of one of the heaps, that had dry cracks in it; I ſaid, I ſuppoſe you remember how that Cheeſe was made; ſhe anſwered in the affirmative, when you made that Cheeſe, I ſaid, you had reſerved ſome Curd from the meal before, and put into the other Curd, next meal, which having been rendled too hot would not join together, as I will ſhew you by the different Curds in the Cheeſe, which I did in my taſter, the white looking Curd being the old Curd which cauſed the cracks, and the yellow the New-milk, (and you may always obſerve a mixture of that kind where Curd is kept, appearing marble & cutting chiſelly)--- She acknowledged that Cheeſe was made in the manner I deſcribed, ſeemed very thankful for my advice, and purſued it very nearly the next Summer, when ſhe produced at the ſame Fair the following Year a Dairy of Cheeſe with very few faults; I pointed them out to her, told her how to remedy them, as in the rules before deſcribed; ſhe thanked me, and the next Year with great pleaſure ſhewed me an exceeding good parcel of Cheeſe.----A near relation of mine; who kept a Butter Dairy, was deſirous of making Cheeſe, and ſaid to me, I am entirely ignorant how to proceed, but if you will point out the right method, I will exactly follow it, I gave her the ſame direction as to the former Dairy-woman, ſhe followed it, and I am certain no one can make nicer, or fatter well-taſted Cheeſe than ſhe did, being one Day ſaying how good her Cheeſe proved, obſerved ſhe had one Cheeſe, then cut, that was jointed and blue pared. I wiſh I knew the cauſe of it; I examined it, & found it muſt be cauſed by Slip-curd; ſhe ſaid, ſhe never altered the Time given for the coming of the Milk after it was rendled, on ruminating the cauſe, I ſaid do you put your bowl in the Tub when the Runnet is in? She replied always; do you ever find any difference in the Curd under the the Bowl from the reſt; on removing the Bowl?---Sometimes I perceive the Curd under the Bowl of a ſmooth ſlippery nature, and when I have tried to get it ſolid, I never can; it always ſlipt through my fingers, and ſome of it would ſwim in the Whey when the other was ſolid, which I always took care to break as ſmall as flour, among the other Curd---I ſaid is the Bowl being there of any uſe? She did not know that it was; ſhe took it away and had no jointed Cheeſe after, in her Dairy; which plainly convinced me that the Air under the Bowl prevented the Curd from coming in the ſame Time as the reſt; and that the ſmall quantity of Slip-curd under it, was the ſole cauſe of the joints that appeared, for there was not an Eye in the Cheeſe, owing to its being broke ſo ſmall, which if any of the Slip-curd had been left in bits of any ſize, would have cauſed Eyes larger or ſmaller in the Cheeſe, but now it diſſolved in the form, & manner before deſcribed, in jointed Cheeſe---Another relation, being pleaſed with her Siſter ſucceeding ſo well, followed exactly the ſame method, having wrote down every particular, and her Cheeſe was remarkably fine and good. Theſe, and ſuch like inſtances convince me that good Cheeſe may be made by Rule, or regular Method, on any Land, providing nothing very ſingular prevents, as from weeds, plants, &c. or diſtempered Cattle: It is often obſerved poor Land makes the beſt Cheeſe; to thoſe who are fond of mild Cheeſe it very often does, the Milk being weaker or thinner, is ſooner collected into Curd, than rich Milk, by which means it is often completely fit to ſink or gather ſooner, and has many chances of making good Cheeſe by that means, or in the ſame Time allowed, than from better Milk, which will not become good Curd in the ſame Time that is given for the weaker Milk; and if the Curd is not ſolid and good, no art can make good Cheeſe of it. But, if rich paſture, good feeding Land being old Turf, has proper Time given it to make good Curd, and the Cheeſe is well taken care of after, I always find the richer Graſs makes the beſt Cheeſe and more of it. To confirm my Opinion, that breaking Cheeſe in the Curd is a needleſs and exceeding waſteful method, being lately at a friend's houſe who keeps a few Cows only to make Butter, and Cheeſe for their own uſe, and a few friends, the Gentlewoman ſaid to me, I could wiſh to know the beſt Method of making fine Cheeſe, ( having met with ſuch at my relations, before mentioned ) and deſired my directions, and ſaid their Cheeſe was apt to be a good while in coming when in the Tub, their paſture being rich old Turf. I told them to give it full two hours, or two and a half, recommended putting Salt in the Milk as before preſcribed, which was done, and to ſink the Curd inſtead of breaking it; after having a long knife made from a lath, I cut the Curd from top to bottom, croſſing it many times, by which means the Whey ſeperated readily, then got a ſieve and they therewith preſs'd down the Curd with great eaſe. Having ſettled the Curd well, and let it ſtand a quarter of an hour to drain, having laded all the Whey out, it become quite ſolid----then the Dairy-maid cut it in ſlices and workt it into the Vat, without ever breaking the curd at all; with very little trouble, and in a ſhort time ſhe made a compleat handſome Cheeſe; full one third part larger than any they had before produced from the ſame Cows, and continued ſo to do in ſucceeding days, the Whey being quite green, which they could never bring it to be, when broke & gathered in the Tub; and broke in the Vat afterward, which method certainly waſtes a great deal of Cheeſe and much impoveriſhes it by ſqueezing the fat out in breaking.

A friendly correſpondent, being a conſiderable dealer in Cheeſe, knowing of my intended publication, is ſo kind as to favor me with his ſentiments on ſome particulars; which, as ſome of them coincide with my own already deſcribed, and one in particular, promiſes great utility to very ſmall Dairys, and will be a conſiderable means to prevent ſour Cheeſe, by pointing out a method to preſerve the Curd without hazard, with his permiſſion I lay it before my readers.
" I have ſome years been trying to find out
" the reaſon why Cheeſe frequently looks
" of a grey dirty appearance, and which is

" always attended with a ſtrong diſagreeable
" taſte, and from enquiries and obſervations
" I have made, I am clearly convinced it is
" owing to the Runnet being kept too long,
" and not being ſweet when put into the
" Milk. It is often the caſe in ſmall Dairys
" in order to make the Cheeſe of a tolerable
" full ſize, to make it but once a day; and in
" hot Weather it is almoſt impoſſible to prevent
" one meal being ſour, which muſt inevitably
" ſpoil the Cheeſe. I beg leave to
" inform you of a method practiſed with
" good ſucceſs. A friend of mine who was
" a Farmer's Daughter, and had been uſed
" to a Dairy, marrying a perſon of a different
" profeſſion, they kept one Cow to give Milk
" for the family, which being ſmall ſhe could
" not uſe all the Milk; ſhe then tried to
" make Cheeſe of the ſurplus, and made
" tolerable ſized Cheeſes, perhaps ſeven or
" eight pound each, in the following manner;
" when the weather was warm, ſhe put
" Runnet to the Milk as oft as ſhe found it
" neceſſary, once or twice a day, while it
" was ſweet; having ſeperated the Curd from
" the Whey, ſhe put the Curd into a broad

" ſhallow Tub, juſt covering it with cold
" Water, and ſhifting the Water two or three
" times a day as ſhe thought neceſſary, and
" thus kept the different parcels of Curd,
" till ſhe had enough to fill her Vat, by
" which means, ſhe made exceeding good
" Cheeſe. Some good Dairy-women, I think
" often err in the manner of breaking their
" Curd; tho' they make good Cheeſe, they
" might make better and more of it, if they
" did not ſqueeze out ſo much of the fat
" in breaking; the Whey that firſt runs from
" the Curd is always the thinneſt, and was
" that thin part firſt ſeperated, before the
" Curd was much broke, it would certainly
" leave the Cream in the Cheeſe, which
" would but little of it ſqueeze out in putting
" in the Vat, but when it is broke ſo
" very ſmall amongſt the Whey the rich
" parts are ſqueezed amongſt the thin Whey
" and carried away with it. I know an inſtance
" or two myſelf, of perſons who I
" firmly believe made their Cheeſe of real
" New-Milk, yet broke their Curd ſo much
" that their Cheeſe was not ſo good as I have
" had two meal Cheeſe. I think the method

" uſed in *Norfolk* and *Suffolk* to ſeperate the " Whey from the Curd, is much preferable " to that uſed in *Warwickſhire*, or *Leiceſter-* " *ſhire;* when they think the Milk is ſuf- " ficiently curdled, they lay a ſtrainer into " a baſket (made for the purpoſe,) which " they put the Curd into and let it ſtand to " drain for a time, before they break the " Curd." In regard to my friends opinion concerning what he calls grey, dirty looking Cheeſe, 'tis often cauſed by foul Runnet, but I am of opinion it more often happens when Cows have been drenched, either for the yellows or other complaints; and it will look of that countenance and get inſipid, or ill taſted when much frozen, as I have more than once had Cheeſe in my own poſſeſſion turn'd of that dark putrid colour after being much froze, that I knew was not ſo before it was affected by froſt.

Being lately in company with a Dairyman at a diſtance, talking about Cheeſe-making, he ſaid he never uſed a Cheeſe-preſs, and ſaid that his Cheeſe got hard as ſoon, and kept as well as thoſe that uſed a Preſs, the method he uſed is, to make the Cheeſe in a Hoop (being chiefly thickiſh ſkim Cheeſe, tho' he ſaid he often made New-Milk Cheeſe in the ſame way) that was open at top and bottom, which being filled with Curd, and well ſqueezed into it, was then ſet upon a board that had holes bored in it, the Hoop alſo being bored and cover'd with a board which was bored alſo, putting a moderate weight upon the board to ſettle the Cheeſe; turning in upſide down, twice a day till it got ſtiff, and it anſwered very well. When Curd is firm, it will ſettle and get hard with very little cruſhing, it is the Slip-Curd that is in it, that makes it require ſo much Preſſing to ſettle it, this method will be very uſeful in very ſmall Dairys that have no Preſs.

Clover, or other artificial Graſs, which generally contains more Air than common Graſs, requires full time in bringing the Cheeſe; in its firſt operation, it ſhould not be expoſed to too much Heat, immediately after it is made, as the greater quantity of Air remains in the Cheeſe, the more effect Heat will have upon it, by cauſing it to heave, or ſplit when the Air becomes rarified. Cheeſe made from Clover is rather more difficult to make, to even the beſt of Dairy-women, but I have ſeen very good ſound Dairys of ſtout, full flavour'd Cheeſe made from Clover, eſpecially when a good deal of time is allowed to bring the Cheeſe, and care is taken not to let it lye too hot after it begins to get dry. It is always hurtful to Cheeſe to lye too near tiles in hot weather. Dairys are ſubject to damage by noxious, or poiſonous plants, roots, or trees. Where Cows are fed in paſtures much addicted to wild garlick, or cow-garlick, ramſons, or wild chives, I have often perceived the rank taſte of the Herb in the Cheeſe; many people are at a fault to know the cauſe of bitter Cheeſe; which I have often obſerved is moſt prevalent from poor, or moderate light Land, and have frequently taken notice that where Cheeſe is bitter, their paſture is much addicted to black plantain, ribbed graſs, or cock-plant---Dandilion, eſpecially the rough leaved ſort, centaury---arſmart---or lakeweed, tanſey, wormwood, meadow ſweet---I take yarrow to be an ill favoured Plant for Cheeſe, where it prevails much in Land,---- Hemlock ---- henbane ---- nightſhade, cow-bane, cow-weed, water-wort, kex, drop-wort, yew-tree, box, and moſt other ever-greens certainly are. * I have often obſerved in riding thro' Dairy-farms how little attention is paid to paſturage, Farmers frequently ſuffering many ſorts of known noxious Plants or Weeds to flouriſh in them, without any concern to extirpate or caſt them out, or of having the leaſt thought of encouraging, or propogating ſuch as are ſalutary or cheering to Cattle; I have often heard the remark made by Farmers that there is an inſtinct in Cattle that directs them to avoid noxious Plants, and even directs nature to apply many as remedies in various complaints; we often read of wild Beaſts, Serpents, *&c.* that are governed by ſuch inſtinct. ---- But it often happens that in very dry ſeaſons, paſtures are ſo very ſhort that Cattle are obliged to eat any thing that is green to keep them alive, and 'tis well known they often do clear up every thing before them, and many ſort of Plants that they will not touch at other times; I have often obſerved that in ſuch ſeaſons, Cattle are very much ſubject to violent diſorders; I have known many die, without the owners, or cow-leech being at all able to account for the cauſe; and frequently taken notice that Cattle dying ſo ſuddenly are much ſubject to ſwell greatly, and often in the ſame Dairy that many have died apparently from the ſame cauſe, and that ſuch complaints are moſt prevalent in the Months of *July* and *Auguſt*, when poiſonous Plants are in full vigour, I remember one perſon who had loſt ſeveral Cows, who was a judicious perſon in Farming affairs, obſerve, that undigeſted Plants were found in their Stomachs, or Maws when opened, although they had not eat any vegetable food for two or three days, which made him ſuſpect they were poiſonous, and 'tis very natural to form ſuch an Idea.

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* A deſcription of noxious Plants, will be found at the end of the Book.

There is no branch in Huſbandry ſeems of more importance, or gives a larger field for improvement than the conducting and managing of Dairy-farms, as a great ſhare of the health, as well as the lives of the human ſpecies, are in a conſiderable degree dependent, on the health and good condition of Milch Cows. Milk being a vegetable juice, or that yields a nouriſhment partly vegetable and partly animalized, partaking more or leſs, of the good or bad qualities of Plants on which the Cow feeds----Milk in its produce of Cream, Butter, Cheeſe and many of our luxuries, is a conſtituent part of our daily food, through every ſtage of Life, conſequently great care ought to be taken, with reſpect to the food of Animals, who furniſh us with ſo great, and neceſſary a part of our ſuſtenance, I have always thought ſome knowledge in the uſe of Plants, a very agreeable amuſement, and it would certainly have been much more my ſtudy, had I thought of ever having ſuch an opportunity of making it uſeful. Such as have fallen under my knowledge I have here endeavoured to deſcribe, in which I acknowledge to have received much help from a late ingenious publication of DR. WITHERING on *Botany*, (being the firſt I ever met with in

Engliſh after the Linnæan Syſtem,) which I think a work of great merit. As the Dairy-man or Farmer becomes more informed of the nature of noxious Plants, he will ſurely think it worth his while to try to get rid of them, by rooting them out; and as it is well known that Cows are very much ſubject to ſcowring, and flatulent or windy diſorders; it may be very well worth his while to ſow or plant in his paſtures and hedges, ſuch herbs in proper quantities as are found to be the beſt remedies for theſe and ſuch other complaints which Cattle are moſt incident to. Among many that might be mentioned the following herbs are very ſalutary, (and if there is ſuch an inſtinct in Cattle as ſome ſuppoſe, they will know how to cull the beſt,) lovage, agrimony, chervil, carraway, cummin, mint, bazil, hyſſop, rue, angelica, pepper-mint, penny-royal, *&c.* I ſhould think a very proper time to ſow, or plant them, would be when you ſet, or plant hedges, or when plaſhed, or the banks freſh made up, or in paſtures where Ant hills are dug up and carried away, to ſow them in the places they are dug from; It muſt certainly be an improvement of the firſt kind, to clear a Farm of all ſorts of noxious & poiſonous Plants & Weeds, and ſtocking them with ſuch as are healthful, ſalutary and medicinal.----Trefoil and white Clover are eſteemed exceeding good Graſſes for producing Milk. But the higheſt encomium is given to Saintfoin Graſs, as being ſuperior to any other.---- An *Eſſex* Farmer who is a correſpondent in the *Bath* ſociety for promoting Agriculture, thus decribes it; " As the roots ſtrike deep in our chalky " ſoil, this plant is not liable to be ſo much " injured by drought as other Graſſes whoſe " fibres ſhoot horizontally and lie near the " ſurface, the quantity of Hay produced is " greater, and better in quality than any " other, but there is one advantage attends " this Graſs, which renders it ſuperior to " any, and that ariſes from feeding it with " Milch Cows, the prodigious increaſe of " Milk which it makes is aſtoniſhing, being " near double that produced by any other " food. The Milk is alſo better and yields " more Cream than any other, I give you " this information from my own obſervation,

" confirmed by long experience, and if Far-
" mers would make trial they would find
" their account in it far more than they
" expect."

It is a pretty general opinion, that Saintfoin thrives only on up-lands, that lie near a rock, lime-ſtone, chalk or ſtrong gravel; the reaſon given is, the roots ſtrike ſo deep in the Earth, that unleſs it meets a check it ſeldom flouriſhes. That ſuch Land, being rocky, or very ſhallow hungry ſoil that will ſcarce bear any other ſorts of Graſs does produce great crops of Saintfoin, I have many times obſerved in different Counties; but as I meet with various Authors who ſay, that notwithſtanding that advantage there is in it, preferable to any other Graſs, yet it always thrives beſt in a rich good ſoil, which makes me imagine it has ſeldom had a fair trial, and if the advantage as a Dairy Graſs is ſo great, it is highly worth the Dairyman's notice.

We find many Farmers very induſtrious to improve their breed of Cattle, and ſet much ſtore by blood and faſhion. The Dairyman's chief concern ſhould be to have Cows with good bags, or udders; that yield a quantity of Milk; and it is well known, by perſons who keep but one or two Cows, that there is a material difference in the richneſs of Milk in Cows, and that when they ſet up the Milk of different Cows, they find, one ſhall yield a much larger quantity of Cream than another; and many are known not only to yield more Milk, but even much better than the Cow which gives leſs; this is an uſeful remark to a Dairyman as the quantity of rich Milk is the ſupport of his undertaking, and muſt in the end pay more than the fine form of Cattle, which may be of more conſequence to the feeding Grazier. It is obſerved in Fairs, that the people from *Wiltſhire* and other Dairy Counties, who buy Cows, always make a large bag in a Milking Cow, their firſt object, and thoſe that buy Cattle for feeding pay very little regard to it, prefering a good Carcaſe; as Dairy-men are generally the breeders of Calves, it ſhould be their firſt object, to breed from Cows, which produce the beſt and largeſt quantity of Milk, and ſupply their own Dairy with that breed. I would always recommend to every Dairy-man, wherever it is in his power to convey running ſtreams into his Dairy-grounds,---to encourage his Cows to frequent ſcowers in Brooks or running Streams; Cows certainly like clear Water beſt, and it always produces moſt Milk; and keeping them cool, the Milk is much eaſier made into Cheeſe, or Butter; when Cheeſe goes from the Preſs, let it be kept in as warm a ſtate as you can, till it has had a ſweat or is got pretty regularly dry, and ſtiffiſh; It is warmth that makes Cheeſe Ripe, improves the colour, and cauſes Cheeſe to cut Flakey, the ſureſt ſign of excellent quality, which is very clear to thoſe who know the great difference there is in Cheeſe that has gone by Sea in the Summer-time to *London*, or any diſtant Port on our Coaſt, having been thoroughly heated on Ship-board, by the heat of the Seaſon, and ſuch large quantities being in the ſame apartment. I dare ſay any Perſon who has eat Cheeſe in the fineſt Dairys in *Cheſhire*, and alſo in a Tavern

vern in *London,* when the ſame ſort of Cheeſe has undergone the Heat of a Ship, and afterwards been laid in a Wine-cellar to cool gradually, and make it Mellow, which is allowed to be the beſt ſituation for finiſhing Cheeſe, it not being expoſed to harſh Winds, or chilling Air; ſuch Perſon muſt allow the Warmth it has received, improves the flavor and richneſs of the Cheeſe to a ſuperlative degree. I would recommend, where it can be avoided. that hard Cheeſe is not kept in the ſame Room with the ſoft, as a Dampneſs that ariſes from the new moiſt Cheeſe is a detriment to the improving ſtate the hard Cheeſe is getting into, making it very apt to chill, and get thick-coated, and often ſpotted; in ſome meaſure there is an analogy with the fine flavoured Fruit, this being the Seaſon that Cheeſe may be ſuppoſed to come to its Flavour, and the foul Damp that falls from the exhalation of the ſoft Cheeſe greatly retards it, and being deprived of a chearing Warmth, will never become excellent. Cheeſe never taſtes agreeably till it has had a ſweat, ſuch as is always kept in a cold ſtate eats Chill, flat-taſted and inſipid; a ſouth aſpect, or a Room over a Kitchen-fire is much beſt, till Cheeſe is got tollerably Hard and had a Sweat; a cool ſhady Room, or even a Plaſter-floor is beſt after it has had a ſweat, till ſuch Time as the Weather gets too Cool. Cheeſe very ſeldom heaves or gets puffy after it has had a ſweat and got cool again; the fat that melts with heat, cloſes the pores of Cheeſe made open by harſh Air, and keeps it Mellow afterwards. The ſweat of Cheeſe ſhould not be rubbed off, or ſcraped off, unleſs it has ſweat to a violent Degree, as it keeps the Cheeſe Mellow and always improves the Flavour. To have every excellence it muſt have every advantage. ----- In *Wilts*, *Glouceſterſhire*, and ſome part of *Warwickſhire*, moſt People waſh their Cheeſe, putting it in a little warm-Water or Whey to ſoften the ſwarthy-coat occaſioned by the Cheeſe-cloth, or not being rubbed when it begins to get coated, then they rub it off with a Bruſh, and afterward lay it to dry, or ſweat before it is laid in the Cooler apartment; many prefer rubbing it with a

Hair-cloth beginning with it when Cheeſe is fit to handle, and not waſh it. If Cheeſe is deſigned for going by Sea, or for ſpeedy Conſumption, I think waſhing is preferable, care being taken not to ſend it off too ſoft, as that expoſes it to crack, then the Fly takes it, and Maggots breeding in it damages your Cheeſe. When Cheeſe is deſigned to be kept long in the Dairy, if kept well cleaned, I prefer the other Method, as the Coat preſerves it, keeps it Mellow and improves the Flavour. Froſt is very detrimental to Cheeſe if permitted to get into it, eſpecially, ſoft young Cheeſe; care ſhould be taken to keep the Windows cloſe in hard froſty Weather; many will cover it and even lay it in Peas-ſtraw in ſevere Seaſons. I have known all the good qualities of Cheeſe annihilated or taken away, by being Froſt-bitten when Young; it is apt to turn black as if made with ſooty Milk, and not have the leaſt taſte of Salt, or any reliſh remain. It is a very common method to ſcald Cheeſe, either in the Curd, or in the Cheeſe; the former I quite diſapprove, the deſign being only to ſettle the Curd which has not had Time given it to ſink ſolid in the Tub, which if done, will want no ſcalding; boiling Water, or boiling Whey poured upon it will ſet the Curd in ſome degree, and fix it hard, but then it always leaves it Tough and Horny-coated, if it is ſcalded to any great degree; more time taken in bringing the Curd, and having the Milk of a proper warmth, will render this whole proceeding quite needleſs. People are only ſeeking a remedy for a fault which they had no ſort of Occaſion to have been troubled with. Scalding Cheeſe after it has been in the Preſs is of ſome advantage to Cheeſe going by Sea, that only being to ſet the Coat and toughen it, is not ſo much expoſed to bruiſing, and the Heat of the Ship recovers it again to its proper ſtate by removing that toughneſs which ſcalding gave it; but Cheeſe for Country Trade, is hurt by ſcalding, making it Tough and Horny-coated. If Cheeſe gets hard that has been ſcalded, the beſt way to recover it, is to lay it in a Heap, four, five, or ſix high in a cool-room, ſtirring and removing every Cheeſe once in two or three Days, till it is got

Mellow. In many Counties, as *Lincoln*, *Huntington*, *Bedford*, &c. People take very great Pains to make bad Cheeſe, if a good Dairy-woman happens to come amongſt them that ſells Cheeſe for a much greater Price than they can, yet they will follow their own Method; perhaps, ſome few of them at leaſt, when they come to ſee Dairying plainly delineated, may have ſome inclination to alter their Plan, unleſs they prefer bad Cheeſe to good,

Many may wiſh to know what is a proper Size for Cheeſe-Vats for Trade. For Cheeſe of the *Glouceſter* make, we reckon that Vats ---- 15 Inches Wide by 2 ¼ Inches Deep to make Cheeſe, Eleven to the Hundred Weight.

15 ½ Inches by 2 ½ to make Tens.
16 Inches by 2 ½ to make Nines.
16 ½ Inches by 2 ½ to make Eights.
16 ½ Inches by 2 ¾ to make Sevens, *&c*.

Since writing the account of the Maw-ſkin, I have heard of a Plant called the Runnet-plant; It is the firſt Time I ever heard the

Name of it or the leaſt hint concerning it. I am informed the *Jews* make all their Cheeſe with it; their Law not permitting them to mingle Meat with Milk, which term they apply to making Cheeſe with Maw-ſkin, I have frequently ſeen *Jew* Cheeſe, but never ſaw any that I thought good or tollerably ſo, makes me imagine it is the neceſſity of principle only, that promotes its Uſe, but as I am an entire Stranger to the proceſs, ſhall be greatly obliged to any one who will favour me with any particulars concerning it, with its qualities and Manner of Uſe.

⁂ *The Plant is deſcribed amongſt others at the End of this Book.*

Having now gone through the deſign of the work, and laid down ſuch obſervations on the principal concerns of Dairying, ſo far as relates to Cheeſe-making, as occur to my remembrance, I take my leave of it, hoping in general it will be found uſeful and expedient, and before I conclude, earneſtly recommend it to ſuch Dairy-women who find any difficulty in their proceedings in the buſineſs of Cheeſe-making, or wiſh to improve their make of Cheeſe, that they will, well weigh every part of the ſubject, and make trial of the whole proceſs, as ſtated, in its different parts. As I am well convinced, by repeated trials that if the plan I have laid down is obſerved with care, it will not fail to make good Cheeſe. And though it may be objected by many, the length of time of the Milk ſtanding for Curd, yet ſo compleat will the ſtate of the Curd be, that you will often times more than ſave that time in cruſhing, as it will be finiſhed in half the time that bad Curd will take, and by the extra weight of Cheeſe, that time will give, will at length repay all your trouble; I well know, many Dairy-women are partial to ſome particular method, or noſtrum of their own, or their mothers, or neighbour ſuch a one who was a famous Dairy-woman, as being preferable to all others, in which they often fail of ſucceſs, in ſome reſpect by having omitted to obſerve the exact minutia of their practice. As a very ſmall omiſſion, in time, or method, ſometimes

times leads them into a labyrinth, which they very rarely ever get out of, and cauſes them more vexation and perplexity, than if they had never known any thing about it, Or, if their's be a good method & very practicable, perhaps it is poſſible there may be a better, or eaſier means of proceeding, that will render their Plan quite needleſs.

I hope that thoſe who wiſh to improve from my Inſtructions, will give it a fair Trial, if any at all; they need not ſay they are left in the Dark in any part of it, as every particular is made plain and moſt of them repeated, as precept upon precept, and line upon line. Let them be particular however in the main concerns, ſuch as the proper warmth of the Milk, the goodneſs, and uſe of the Maw-ſkin, to give it Time enough in the Tub, or Cheeſe-pan, to keep the Cheeſe warm when young, and cool afterwards, then I think they will ſcarce fail of making good Cheeſe. If they mean to excel, and make fine Cheeſe--- and why not?---Then I refer them to the more minute Obſervations of the Work, and I wiſh, and hope, that they will find their Pains well beſtowed, and afford them both Comfort and Profit. I doubt not but Methods uſed in different Counties vary a good deal. Some perhaps may be pointed out that are preferable to ſome of mine, and if any Perſon will be kind enough to point them out to me, or ſhew me where any thing has been omitted, or Error committed, if a ſecond Edition ſhould be called for, I ſhall very willingly communicate them to the Public.

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# ON

# BUTTER.

BUTTER is an Article in very general uſe, and numerous are the people employed in making it; and is in great eſteem; from obſervations I have made, it admits of very little variation in the method of preparing, which methods are ſo generally known, require very little commentary upon them; I profeſs not to underſtand them, and therefore ſhall ſay very little about it. What little I have remarked in converſing with Dairy-women, is, that care ſhould be taken to ſet up your Milk when it is of a proper warmth----Milk-warm is the beſt, regulated the ſame as for rendling Cheeſe, applying a little cold Water if too hot, and either warm Water or Milk if too cold; many think Water beſt ſaying, it will throw up Cream ſooner; to take care the Utenſils it is ſet up in are exceeding

ing clean---the utility of which I think is clearly made appear by obſerving the effect of a contrary remark in making Whey Butter. ------- Indolence, finds out many ways, which Induſtry never thought of.--- Some Butter-Women, whoſe care is, more, to make a large quantity, than regard the quality or flavour of Butter, will tell you, that ſour Whey, yields more Cream than ſweet, and it immediately turns ſour, by putting it into the Pans you poured the laſt meals Whey from, without waſhing them. But in making good Butter, great care muſt be taken to prevent the Cream's being ſour, or your Butter will be ill flavoured, and will keep good but a very little time---That lead Pans are preferred to every thing, in throwing up, or riſing the Cream from Milk. Not to let the Milk ſtand too long before it is ſkimmed, eſpecially in hot weather.----If it muſt ſtand two meals, it had better be ſkimmed twice, than to let it ſtand the whole time for one ſkimming, as the Milk often turns ſour before the expiration of two meals; and if the laſt meal ſhould change, you may then be enabled to keep all the ſweet Cream by itſelf.------The leſs time the Cream ſtands before it is churned, the finer flavoured and ſweeter your Butter will be.

Nothing is more commendable in a Dairymaid than cleanlineſs, nor will any thing cauſe them to be more eſteemed; every one who preceives extream neatneſs in a Dairy, cannot help wiſhing to purchaſe either Butter or Cheeſe from ſo clean and neat a place, and would gladly give a higher price, rather than be expoſed to the chance of ſluttiſh naſtineſs, too common in many Dairys. It is remarked by many Travellers, that in the *Iſle* of *Wight,* nothing is more pleaſing than to ſee the exceeding neatneſs of their Dairys; it very rarely goes unnoticed, and to a delicate taſte, ſcarce any thing affords greater pleaſure.

As Butter is become a very conſiderable Article of Trade, it is highly proper every means ſhould be rendered to make it as complete and perfect as poſſible; it is very different in regard to purchaſers of large quantities of Butter, who muſt take lots as they happen, and in which very often a conſiderable part of them are very inferior to what they ought to be, and to buyers of freſh Butter in Markets; who can ſee and taſte it before they buy, which is a caution to the makers to have it well made, knowing it will be inſpected before ſold, thoſe who put it into Caſks or Firkins, for diſtant ſale, are apt not to be ſo very careful about it. I have heard frequent enquiry by Cheeſemongers, or dealers in Butter, what is the cauſe of Salt Butter being ſo ſubject to get rank, ſtrong taſted, or rancid, or what ſome people call a fiſhy taſte, which is a very great detriment to dealers in Butter, and the cauſe of the complaint much wants to be known; being well acquainted that the complaint is very frequent, has often led me to enquire into the cauſe when an opportunity has offered, being lately converſing with a perſon on the ſubject, he ſaid it was very common in *Suffolk*, & *Yorkſhire*, to heat the Milk before it was ſet up for Cream, which is done in order to encreaſe the quantity of Cream. It is well known that every fat ſubſtance that is heated, will in courſe of time turn rancid, or reezy, that when Butter, of the laſt year, or a year old, is in the Caſk through the Summer, the heat will affect it, and ſo far as the heat gets into it, will reeze or get of a tallowy nature, fat Bacon will reeze ſo far as the fat melts, and the heating of Milk muſt certainly alter the nature of it, and in courſe of time will cauſe the Butter to turn rancid, and ill taſted. I have heard it obſerved by a perſon who is uſed to buy freſh Butter that was made of heated, or clouted Cream, ( which is a method much uſed in ſome parts of the South of England ) that it is very apt to get foul and will keep good but a very little time. So that from all remarks I have been capable of making, it ſeems clear to me that the badneſs or foulneſs of Butter, is chiefly owing to the Milk being heated, and is a hint worth the enquiry of the public, eſpecially large dealers in Butter, in order that ſome method may be taken to prevent an evil that is become ſo very prevalent.

# *SOME ACCOUNT*
# OF
# NOXIOUS, BITTER and POISONOUS, PLANTS.

RIBWORT, ribbed graſs, black plantain or cock plant, this plant may not properly be ranged among bitter plants, it not being bitter to any great degree but I have often thought, upon examination that the bitterneſs in ſome Cheeſe more reſembles the taſte of this plant and dandelion than any other whatſoever, and in barren ſoils they are apt to prevail more than any other.

Arſmart, or lakeweed, is a bitter plant, well known; 'tis ſaid to produce an eſſential oil, or oil extracted by diſtillation, which I ſhould imagine more likely to affect the bitterneſs of Milk than colder plants, it is apt to grow very ſtrong after being mowed; and I have not obſerved that Cows refuſe or leave it untouched more than other plants in common. I think this plant much more likely to cauſe the bitterneſs of Butter in *Autumn* than the falling leaves to which it is generally referred, though many people are of opinion that Cows eating aſh leaves in *Autumn*, cauſes the bitterneſs in Butter.

Meadow-ſweet----is a bitteriſh plant that Cows are fond of, eſpecially the ſort that grows on up-lands, commonly called dropwort, the meadow-ſweet of low-meadows is a ſort they do not readily feed on where there is plenty of Graſs.

Centaury, leſſer centaury or gentian, is an extream bitter plant, bears a pale red bloſſom with many florets, or peeps, on an upright ſtem in old Paſtures, blows from *June* to *Auguſt*, I ſhould imagine it muſt be hurtful in Dairy-ground being a very penetrating bitter.

Hemlock, with ſtems and branches ſpotted with brown, or black, and white flower;

the whole plant is poiſonous, it grows in hedges, orchards, or among rubbiſh, and is very common.

Henbane, with bloſſoms purple & brown---indented leaves, embracing or cleaving to the ſtem, grows on road ſides or among rubbiſh, the ſeeds, roots, and leaves taken internally are all poiſonous.

Nightſhade, grows in moiſt brakes and hedges, with bluiſh bloſſom, ſometimes inclined to fleſh colour, ſometimes white.

Deadly nightſhade----dwale---or belladonna is the worſt ſpecie, growing in woods, hedges, among lime-ſtone or rubbiſh; the ſtem is herbaceous or of a herby nature, the leaves, ſpear, or halbert ſhaped, the flowers of a bluiſh purple with a bright yellow thrum, chives, or pointal, appearing like the ſnuff of an expiring Candle, the berries grow in very handſome bunches, firſt green, than a fine red, next a beautiful black, are very tempting to Childern having coſt many their Lives, cauſing ſtupor, de-

lirium,

lirium, and convulſion, and are certain Death if not prevented by timely and plentiful vomiting; this plant cannot be too well known being ſo very common in moſt Countries, and ſo tempting, both to Children and Cattle.

Cow-bane, water-viroſa, or water-hemlock---- with rundles or flower branches oppoſite the leaves, leaf-ſtalks with blunt borders, with about ſeven pair of little leaves, which are variouſly divided and indented, petals, or leaf of the flower, yellowiſh pale green, grows in ſhallow waters, is a perennial plant, or that continues from year to year, blows in *July;* this is one of the rankeſt of our vegetable poiſons; numerous inſtances are recorded of its Fatality to the human ſpecies; an account of it may be ſeen and an engraving in Martin's Philoſophical Tranſactions, Vol. 10. Early in the ſpring when it grows in the water, Cows often eat it and are killed by it, but as the Summer advances and its ſmell becomes ſtronger, they carefully avoid it, though a certain fatal poiſon to Cows. Goats devour it greedily and with impunity, Horſes and Sheep eat it with ſafety.

Cow-weed, or wild Cecily, grows in hedges, blows in *May*, or *June*, with white flowers, roots like a Parſnip, and is very poiſonous.

Water-wort, Water-hemlock, or Water-ſkeleton, is eſteemed a fatal poiſon to Horſes, occaſioning them to become paralytick, which is owing to an inſect called *Curcutia Paraplecticus*, which generally inhabits within the ſtems; the uſual antidote is pig's dung, the branches of the leaves ſtradling----ſtem very thick, hollow, ſcored, petals or flowers white, grows in rivers, ditches and pools, bloſſoms in *June;* in the winter the roots and ſtem diſſected by the influence of the weather, afford a curious ſkeleton, or net-work.

Kex, or water-parſnip, with white flowers in *July* or *Auguſt*, grows in rivers and fens, is very noxious to cattle; alſo the leſſer Kex called upright water-parſnip, in rivers and ditches, is very common, bloſſoms

in

in *July* and *Auguſt,* leaves halbert ſhaped, rundles or flower-branch oppoſite the leaves.

Drop-wort, or dead tongue grows on the banks of rivers, bears a white flower in *June,* the petals or leaves of the flower ſharp---- bent inwards, tips purple or brown----the whole of this plant is poiſonous, the ſtem is a yellowiſh red, the leaves ſmooth, ſtreaked, jagged at the edges, the root is the rankeſt and moſt virulent of all vegetable poiſons.

Mithridate----or penny-craſs, grows in corn fields with oblong leaves, toothed, ſmooth, white bloſſoms; the whole plant has ſomething of a garlick flavour, the ſeeds have the acrimony or ſharpneſs of muſtard; Cows are rather fond of it and I ſhould think their Milk is often affected by it.

Penny-wort, or white-rot, grows in marſhy ſpringy ground, with a pale red flower, blows in *May*; many Farmers ſuppoſe it occaſions the rot in Sheep, but I ſhould expect that complaint proceeds from a very different cauſe; though, if flowks that are ſuppoſed to be the certain cauſe of the Rot, or the ſpawn of them, are taken in with the food of Sheep, as ſome imagine, it is poſſible the Ova, or Eggs of this Inſect may be depoſited in this plant, which to know, may be worth the Farmer's enquiry.

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## *Some Account of the* RUNNET PLANT.

YELLOW Verum---Gooſe-graſs. The Leaves growing by eights, or eight leaves round the ſtem, ſtrap-ſhaped----furrowed---the flowering branches ſhort, bloſſoms yellow.

Engliſh Names, are yellow ladies bedſtraw or Cheeſe renning, or petty muguet; it grows in dry ground, on road ſides, very common, is perennial, blows in *July* or *Auguſt*. The flowers will coagulate boiling Milk and ſome *Cheſhire* Cheeſe is ſaid to be made with them; according to an experiment from *Borrchius* they yield an Acid by diſtillation. The *French* preſcribe them in hyſterick and epileptick caſes, boiled in Allum-water they tinge wooll yellow, the roots dye a very fine red, not inferior to Madder and are uſed for this purpoſe in the *Iſland* of *Jura.* See *Pennant's Tour,* 1772, Page 214. Sheep and Goats eat it, Horſes and Swine refuſe it, Cows are not fond of it. If the roots will anſwer the ſame purpoſe as Madder it highly merits the obſervation of *Callico Printers* and others, who uſe large quantities of that Article, as it is the moſt common weed, and what in the month of *July,* there is more of than any other weed, and if the flowers will dye yellow, and make Cheeſe, it muſt be a very valuable Plant and be a great help to the poor to collect it, as it grows on all road ſides, old paſtures and hedges in great abundance.

I have omitted giving the Latin names of Plants, not having ſufficient knowledge in that Language; but ſuch of my learned readers who wiſh for that addition, may refer either to *Dr. Withering's,* or other books on *Botany,* to *Chambers, Croker,* or other Dictionaries.

A DIS-

# A DISSERTATION,

## *ON*

# APPLE-TREES.

THE Apple-Tree, being ſo much propagated, in moſt parts of this Kingdom. I ſhould ſuppoſe is as well known as any Tree whatſoever. It is a Tree of great importance, eſpecially in the Cyder Countries, is much planted for common uſefulneſs in all parts; the variety of its Fruit ſo much admired, and as I have long perceived a great deficiency in the Culture of ſo uſeful a Tree, makes me wiſh to give a few hints to encourage the improvement. It is not my deſign to write a Treatiſe on the general propagation of the Tree, or the variety of its Fruit. But as it is ſubject to many evils, which at preſent have very little regard paid to, or any endeavours to remove them, I dont know when I ſhould have an opportunity of affording my Country ſo much ſervice on that head, as by ſubjoining my thoughts thereon to my Treatiſe on Dairying; eſpecially as it much concerns and affects the ſame People: As generally where there is a Dairy, there is an Orchard more or leſs, and the difference between good bearing Trees, and poor ones, is too evident to need any apology for the deſign. I obſerve in Orchards in general, very little regard is paid to Culture. When Apple-Trees are planted, take to growing, and become fruitful, they generally take their chance for every thing elſe. But a proper method of Culture, adds greatly to the improvement as well as the encreaſe of the Fruit, and as I never knew but one Perſon who made a point of managing an Orchard properly; and where I had an opportunity of obſerving the utility of it; I dont know how I can give a better method, than in deſcribing that, as I never ſaw finer and better Fruit, or more plenty of each ſort produced. The chief difficulties in

Orchards generally happen when Trees are fully grown, being very ſubject to get foul, knotty, decay'd & drooping with Age, when they ſhould be in full vigour; owing to the want of a little care in time. It is proper to obſerve, that young wood in Trees, that are kept clean, always produce the fineſt and beſt Fruit, and the moſt of it. When you have young Trees, always be careful to keep in them ſuch branches, as will get ſtrong, and capable of bearing Fruit; cutting out ſuch branches as grow luxurient, or drooping, and take care to keep all parts of the Tree equally full of Wood, by which means they will be apt to grow upright, and always take care to have the branches kept free and open to the Sun and Air, which ripens and much improves the Fruit----not leaving them crouded in any part----always take care to keep the Trees from getting Moſſy, which may eaſily be done by taking care in time----where ſoils are very ſhallow, lying near ſharp gravel, ſtone, or any hard ſubſtance, they are very apt to get foul and weak betimes, and Trees in ſuch ſituation will ſoon decay; but there are ſome kinds that will thrive and continue longer in ſuch ſoils than others, and when you find that to be the caſe always plant the beſt ſort of ſuch Trees, that are known to flouriſh in the neighbourhood; you will often find in ſome Countries that are unfavourable to Apples, that there are ſome kind of Crab-Trees that flouriſh very much, and bear plentifully of fine large Crabs; where this is the caſe you may depend upon it that the ſoil is favourable to that kind, moſt likely the roots ſtrike more horizontally and thrive better than thoſe ſorts which ſtrike perpendicular; I would recommend that you ſow the ſeeds of ſuch Crabs, to raiſe ſets or ſtocks to graft your Apples upon, chooſing ſuch plants as are free from tap-roots, or cutting the tap-roots off when you ſet them,* which if done when young will throw out roots horizontally, and become ſtronger, and not be ſo ſubject to decay the Tree. By which means you will overcome in a great meaſure the difficulty of the ſituation your ſoil is expoſed to; and may then engraft, good Fruit on theſe new raiſed ſtocks with ſucceſs.

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* Tap-root is one that grows perpendicular to the trunk of the Tree.

When you plant young Apple-Trees 'tis a very good way to open a hole in the ground four or five feet wide, and three or four feet deep, lay the ſoil up, and let it lie open for two or three months, or longer, if you intend to put the ſame ſoil in again, if you turn it over once a month it will better imbibe the nitrous particles of Air, and other atmoſpherical help, and increaſe its fertility, but where you can conveniently do it, I would always recommend it, to prepare a burrow of ſoil a year before, from old Turf, cut off road ſides, or freſh ſoil of a different kind from that where your Apple-trees are to grow, that has been mixt with rotten Muck, and turned over two or three times; a ſtrong loomy ſoil inclinable to clay is preferable, if your Orchard is mold or light ſoil; in which let let your Trees be planted, which will cauſe them to throw out vigorous roots, and when they come to ſtrike into the native ſoil will imbibe freſh ſalts and grow with more ſtrength; your Tree will then get ſtrong in its youth, which it will never forget; take care in pruning your Tree to leave only ſuch branches in, that are well ſituated, to make your Tree handſome and ſtrong, preferring branches that point upwards to thoſe that droop, never ending or toping any branches in a young Tree, unleſs where you want a ſupply of young wood in your Tree. Thus you are laying a good foundation for a handſome fruitful Tree. Examine your young Trees, if any Moſs appears on the ſtem or branches, rub it off; a Pail Bruſh with end hairs is uſeful for the purpoſe, as that will cleanſe forked Branches. Gardeners commonly rub the moſs off after a ſhower of rain, as it then parts eaſy from the tree; if you dip your bruſh in ſoap ſuds it will have a good effect, and is a great antidote to the very minute Inſects that are a means of fouling Trees, by the fine webbs they ſpread upon it. Moſs, is a great enemy to Fruit-Trees, not only deſtroying them itſelf, but is a receptacle for the various Inſects which inhabit the Tree, to depoſit their Eggs in, againſt the enſuing Year, ſome of which remain in the form of

Eggs during Winter, the Inſect reviving with the warmth of ſpring, in the form of a grub or caterpillar, others in Chryſalis, or ſhell depoſited under the Moſs or Bark of the Tree, from which the fly, moth or butterfly reſumes its form, as warmth calls it forth----- You may by common obſervation perceive that Inſects of the butterfly or moth kind encreaſe their ſpecie by Eggs, which tranſſform firſt into grubs, caterpillars, worms or maggots of different kinds according to their ſpecie----then ſecondly to a nymph, chryſalis or aurelia, being a ſhell compoſed of the outer ſkin of the catterpillar----then thirdly from the chryſalis, comes forth the moth or butterfly. You may alſo obſerve that each different ſort or ſpecie feed on a particular Plant or Tree, and on nothing elſe----that the Parent always lays its Egg, on thoſe Plants or Trees that ſupport the caterpillar in its reptile ſtate----as you may obſerve the white butterfly always lays its Eggs in the leaf of a cabbage or colliflower----other kinds of butterflies lay their Eggs in borecole---- others in other Winter greens----the grubs being different----the caterpillar lives as long as its time of growth continues, then retires to the earth into its chryſal ſtate, and ſuch of them as ſurvive the ſeverity of the Winter and other miſchances, revive with the Spring in a new race of butterflies or papilios-----Moſs is a plant that grows on Trees, and ſhoots out a prodigious number of little roots and branches----What makes it injurious to the Tree, is the number of roots greatly exhauſting or draining the ſap of the Tree, and together with the branches of Moſs, covering greateſt part of the body of the Tree, cloſe, in a great meaſure the Air-veſſels, and conſequently, render the Tree incapable of reſpiration, and the Moſs imbibes the chief nouriſhment from Dews and Rains, which the body of the Tree ſhould acquire, leaving only the root, leaves and lateral branches, for affording the ſupport of Tree, bloſſom and Fruit. The deſtruction of ſo great an enemy as Moſs, is of amazing conſequence to the well being of Trees. When Trees are young---or in Trees near hand, as Gooſeberrys, Currants, Wall-trees *&c.* it may be eaſily kept down; when grown to a bulky Tree, the ſame method will not do; a more extenſive one is recommended, *viz.* in *November*, or *December*, when the leaf is fallen, and the buds not advanced, take a boltin, or bundle of Wheat or Rye-ſtraw, from which take as much as your hand will graſp, if a large Tree, or leſs to a ſmaller. Tye it, or twiſt ſome ſtraws round to keep it from ſpreading, then ſet fire to one end of it holding the whiſp in your hand, draw the fire gently along the Tree or Branch on which the Moſs is collected, backward and forward, with a motion ſufficient for the fire to catch the Moſs, and burn it, but not to catch the bark, by which means you deſtroy the Moſs, and give the Tree free Air.

By burning the Moſs, you deſtroy at the ſame time, the Ovas or Eggs, the Chryſalis and grubs that would infect your Tree the next and future Years, and give new life and vigour to your Tree, a careful hand may perform this fiery operation without injuring the branches at all, and would be apt to do it better in the evening then by day-light —— it is a good way to ſweep the Tree afterward, eſpecially the forked parts to prevent a lodgment of filth--where there is many large Trees, it will be a great work, the beſt way is to do ſome one Year and ſome another---young Trees will very eaſily be kept clean, by this method.

When Trees get old and knotty, the beſt way is to lower the foul heads, by degrees, taking two or three away at a time, once in three or four Years, by which means you may ingraft a freſh on ſome, or train new ſhoots from others; always remembering to keep one or two upright branches on the Tree till your young wood begins to flouriſh; as that will draw the ſap upwards to encourage the young ſhoots, which often for want of that precaution is very hurtful, and many times deſtructive to the Tree---When we ſurvey a Catalogue of the numerous Inſects that live, breed, and feed on the various ſorts of Apple-trees, Pear, and Crab-trees; ſome on one kind and ſome on another---'tis no wonder that their progeny ſhould ſome times deſtroy the whole foliage of the Tree, as well as its tender branches.

The learned Botaniſt informs us, that the various kinds, produce, and feed, the great Tortoiſeſhell Butterfly, *December* moth, ſpotted buff moth, Lappit moth, Yellow tuſſock moth, Codling moth, Yellow-headed-fly, gypſy moth, black tuſſock moth, pear-louſe, Grey chermes, Black curcutio, Yellow tail moth, Dagger moth, Plumbtree moth, Black arches, Apple louſe, Garden beetle, *&c.* beſides many kinds of Spiders, and creeping Inſects.---It is often times ſeen, in dry parching Seaſons, that they will devour every leaf and bloſſom, and deſtroy even the tendrils and foot-ſtalks---one principal reaſon why theſe Moths are ſo little known, is, they are moſtly nocturnal, or Night Inſects.

You will find on examination, that the burs or knots on Apple-trees are all inhabited, having various kinds of minute Inſects on their Ova's contained in them, in various cells or compartments; they are cauſed originally by ſuch Inſects, who ſtop the flowing of the ſap for their food, and cauſe it to incruſt on the branches in the forms we find them.

Apple-trees growing in Orchards are ſubject to impoveriſhment more than many other kinds. The nature of the Trees, or dropping of their leaves doing very little injury to the Graſs, it is very often mowed and carried off, without any manure to help even the Graſs, much more the Trees.

My Friend referred to in the beginning of this diſſertation had an excellent method of helping trees in this reſpect; uſed in different Years, in Winter, to cauſe ſome of the trees, to be dug round for ſeveral Feet from the Butt, which let moiſture to the Roots, digging it two or three times while open to admit nitrous Air, and other particles for vegetation; at the laſt digging, he always got ſome kind of animal or vegetable manure, as leaves, plunts, *&c*, the refuſe of the Garden, put into a hole dug to catch the ſoakage of a Farm-yard, having let them remain in to rot and ferment, uſed to have them dug in near the roots of the trees, but what he preferred to every thing, and found the moſt fertile, was the contents of a butcher's blood-hole, with entrails and excrements, having the drainage of a pig-ſty, horſe-muck-hill or ſtable into it---which he had uſed to have reſerved for that purpoſe; 'tis a very good method, where you can do it to let the drain from a Farm-yard through your Orchard.---You generally find trees that grow within reach of ſuch moiſture, very apt to be loaded with Fruit.---I have known great improvement, in the increaſe of Fruit on Garden-trees, by making a Baſon round, and to ſome diſtance from the bottom of the trees, and ſupplying it plentifully two or three times in a Spring, or in Autumn, with ſcouring Suds from the Jerſey-comber or Hatter, when ſcouring Wool; Soap, and the foulneſs there is upon Wool, are known to be great Enemies to many kinds of minute Inſects, which are amazing numerous on Fruit-trees, though not diſcernable by the Naked-eye, my Friend uſed at the time the trees were dug round to have them frequently watered with the Soakage which drained from the Yard as before deſcribed---And in order to have a very powerful compoſt to aſſiſt ſmall trees, to plant Flower-roots in, to ſet Cucumbers, &c. uſed to have a hole dug, in which was put a cart load of good Loomy Soil, upon which the Family uſed to put their Soap-ſuds, Chamber-lye, Brine, Soot, Wood-aſhes, &c. After it had long imbibed theſe different Salts, he uſed to have the Soil took out, laid to dry, & mixing it with a little Lime, after ridling it fine was fit for uſe.----Great Improvement is made in the culture of the Gooſberry and Currant-tree.--- by keeping them clean from Moſs---avoiding ever cutting them with ſhears, pruning them in *November* or *December*, bringing your trees up to a ſingle ſtem, cutting out old wood every Year, and bringing up new----leaving in, only young bearing wood, taking out at the ſtem, all that grows too high, never ending, or topping any branches.----I much prefer ſetting ſeedling Gooſberry-trees to either cutting or ſcion, as you may from ſeedlings, raiſe your tree to what form you pleaſe, and by the time they come to bear Fruit, they get ſtrong roots to ſupport and ripen it.--No tree of any ſort, bears well till it has got a good root.

I am not clearly of opinion----that Moſs is the natural production of Fruit Trees;---- I am rather inclined to think otherwiſe, my reaſon for ſuch opinion is, that ſuch various kinds of Inſects, whoſe offspring is to be ſupported on Trees of different ſorts, do from time to time, carry from other Trees, and fix on thoſe they chooſe to be the reſidence of their progeny, Moſs, or other ſubſtance in which they lay their Eggs. Which Moſs taking root on the branches, increaſe the ſecurity of future generations -----It is natural to imagine they would fix on young Trees for their purpoſe as being moſt prolific----I do not imagine ( with many ) that blights are produced by eaſterly or cold Winds, ſo far as to ſay they come in the Air, but that the Inſects that infeſt, and are ſo hurtful to Trees, in general, are bred in the Tree. And when the ſap riſes, to encreaſe the growth, and vigorous young branches ſhoot forth. If by Froſt, cold Wind, or the like, theſe branches receive a check, that impedes their growth,----Then----the numerous tribe of Inſects, ſucking the vitals of the tender ſhoots, overcome them, and cauſe them to decay. Which if theſe vigorous ſhoots, meet with no ſuch obſtruction---will then increaſe in ſtrength and overget the power of theſe devouring Inſects, tho' exceeding numerous.

I am not of opinion that what is called honey dews, fall from, or come in the Air as is generally imagined. Whenever you ſee a Plant or Tree whoſe leaves are cover'd with that viſcous, luſcious fluid, called honey dew; If you turn up the leaves over them on which this ſubſtance is fallen, you will always find numbers of Inſects of the Tree louſe kind, on the under ſide the leaves, ſucking the juices from the ſaid leaves, and ſquirting them down upon the leaves, beneath them, which on a nice inſpection you may plainly perceive, and this excrement, I doubt not is the real honey dew.

It is an old ſaying, every thing begets its likeneſs---ſo I may ſay---one digreſſion produces another---I cannot omit to mention, an uſeful remedy for preventing the deſtruction, cauſed by the fly on new ſown

Turnips ---- which I have been much the cauſe, in a great meaſure of recommending into practice in this Country with great ſucceſs, but as I find in my Travels it is not ſufficiently known, and the conſequence affects ſo many people, I eſteem this the beſt way to make it public----When you ſow Turnip-ſeed, take for every two pounds of Seed you ſow, one quarter of a pound of Sulphur or Flower of Brimſtone, mix them well together, let them ſtand ten or twelve hours, then ſow them on your Land, the Seed will ſo much imbibe and retain the ſulphurous particles, as to prevent the fly from touching it.

I remember to have read in a Letter to the *Bath* Agriculture Society, a deſcription of the cock-chaffer, and grub, that produced it, mentioning the great devaſtation it makes in Farms----but not giving any ſatiſfactory method for a cure. I believe the great grub, is too well known in moſt Countrys to need a diſcription; being lately in company with a Farmer who was complaining how much he ſuffered by them----ſaid he was quite in hopes he was got into a method to deſtroy them, as he had made one trial with good effect, as 'tis a remedy in every one's power, making them acquainted with it muſt be uſeful, if it proves effectual will be of infinite ſervice, and ought not to be concealed.----When hard Froſt was ſetting in, the Farmer ſaid, he muſter'd all his ſtrength to Plow up a piece of green-ſward that was much affected by the great grub, on fixing or turning up the lays, they appeared exceeding numerous, it being a ſeaſon that food was ſcarce, the rooks and crows came in great numbers from all quarters and devoured them,* the Froſt ſet in very ſharp which deſtroyed them very much, he could perceive very few left, a ſecond Froſt ſetting in he gave it a croſs-plowing, which turned up a good many, but in the third Plowing he perceived ſcarce any, and thoſe the rooks deſtroyed, that he had a good crop the enſuing year, had plowed the Field a ſecond year in the Froſt, and imagined that had quite done for them----as I thought this the moſt rational project on the ſubject I have met with---many others may be of the ſame opinion.

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* Many People turn a large quantity of Ducks into their Field to pick up the Grubs.

The nature and powers of vegetation, appear to be but little known, or underſtood, amongſt the principal part of thoſe concerned in Huſbandry. Natural Phyloſophy, or making enquiry into the properties of matter, or what may be ſtiled the ſtudy of the Philoſophical part of Agriculture, by experiments ariſing from the real effects of nature, have ſo little employed their attention, there ſeems to be wanting ſomething to ſet their mental powers to work, which is what I principally intend by employing my thoughts and pen, on the ſubject, in the following pages.

Although the wonderful ſyſtem of vegetation, is fraught with ſublimity, far beyond my conception, yet ſome few leading hints, I hope may be found uſeful, and the more ſo, as deſcriptions of this nature are moſt commonly met with in voluminous Authors, which very ſeldom fall into the hands of the Huſbandman.

Huſbandman, I have endeavoured to collect ſuch as promiſe the greateſt utility, referring the improvement, with the ſucceſs, to their diligent application.

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# ON

# VEGETATION.

A Vegetable, as deſcribed by the learned, is a term in Phyſiology, applied to all Plants, conſidered as capable of growth; that is, to all natural bodies which have parts organical, formed for generation and accretion, but not ſenſation. In Vegetables there is ſuppoſed to be a principle of Life, commonly called the Vegetative Soul. *Boerhaave*, very ſcientifically defines a Vegetable to be a body generated of the Earth, to which it adheres, or is connected by parts called roots, through which it receives the matter of its nouriſhment, and increaſe, conſiſting of juices and veſſels, ſenſibly diſtinct, or diſtinguiſhed from each other, to which grow roots, or parts; whereby it adheres to ſome other body; from which it derives the matter of its life and growth.---

This definition furniſhes a juſt Idea of a Vegetable, for by its conſiſting of veſſels and juices, it is diſtinguiſhed from a Foſſil, and by its adhering to another body and deriving its nouriſhment therefrom, it is diſtinguiſhed from an animal: A Vegetable is called an organical body, becauſe conſiſting of different parts, which jointly concur to the exerciſe of the ſame function; adhering by ſome of its parts to another body; for we know of no plant that is ſo abſolutely vague and fluctuating, but hath ſtill a body it adheres to; though that body may be various; for inſtance, earth, as in our common plants; ſtone, as in rock-plants; water, as in ſea and river-plants; the root of a plant may have any ſituation at pleaſure, with reſpect to the body thereof, nor needs it either be loweſt or higheſt, as is found in aloes, coral, moſſes, funguſes's, ivy, creepers, &c. the root is frequently uppermoſt, and the growth downwards, the vaſcular* ſtructure of Vegetables is rendered very apparent, by an experiment of Mr. *Willoughby;* cutting off ſome pretty big branches of birch, and making a ſort of baſon or reſervoir on the end thereof with ſoft wax, upon filling this with water, and holding the branch upright; * the water in a few minutes ſunk into the Veſſels of the wood, and running quite through the length, dropped out conſiderably faſt at the other end, continuing ſo to do, as long as the water was poured on—the ſame ſucceeds in many other trees. —Philoſophical Tranſactions, No. 70.

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* Vaſcular—with divers Veſſels, Veins, Arteries, &c.

Vegetation, is the act whereby Plants and other living bodies, receive nouriſhment and growth; Plants, we learn from the Microſcope conſiſt of different parts, Veſſels, *&c.* analagous to thoſe of animals: And each kind of Veſſel is ſuppoſed to be a vehicle of a different humour, or juice, ſecreted from the maſs of ſap, which is conſidered as the blood or common fund of them all. Dr. *Grew*, aſſigns the office of the ſeveral Veſſels: Thoſe placed on the inner verge of the bark, he calls *Lymphæducts*, and ſuppoſes them deſtined for the conveyance of the moſt aqueous, or watry liquor,----Theſe Mr. *Bradley* calls, the new forming Veſſels, which are annually produced, and help to increaſe the bulk of the tree. Thoſe in the middle of the bark, Dr. *Grew* calls the lactiferous or reſinous Veſſels, their uſe according to *Bradley*, is to return the ſuperfluous ſap; theſe Veſſels *Grew* obſerves are the principal viſcera † of Plants; and adds, that as the viſcera of animals are but ſuch Veſſels conglomerated; ‡ ſo the Veſſels of a Plant are viſcera drawn out at length. To the nutrition of Plants as well as that of animals, it ſeems neceſſary that there be a concurrence of two ſpecifically diſtinct fluids, and a learned Author maintains an intermixture of two ſuch humours in every part of the tree, like that we obſerve in linſey-woolſey; every part being impregnated with other tinctures, and continually filtered from fibres of one kind to thoſe of another; and from this mixture, many of the Phœnomena of the ripening, odours, colours, *&c.*

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* Inverted.

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† Viſcera—The inteſtines, containing—Heart, Liver, Guts, Bowels, *&c.* ‡ Conglomorated, compoſed of many Veſſels, wrapped or folded together.

are accounted for---the proceſs of nature in the vegetation of Plants, is very accurately delivered by a *Foreign Author,* to the effect following.----The Egg, or Seed of the Plant being excluded out of the Ovary, called Pod, or Huſk, and requiring farther foſtering and brooding, is committed to the Earth; which having received it into her fertile boſom, not only does the office of incubation; ‡ by her own warm vapours and exhalation, joined with the heat of the Sun--but by degrees ſupplies what the ſeed requires for its farther growth as abounding every where with canals and ſinuſes, § wherein the Dew and Rain-water, impregnated with fertile Salts, glide like the Chyle, and Blood in the arteries, *&c.* of animals. This moiſture meeting with a new depoſited ſeed is percolated, or ſtrained through the pores or pipes, of the outer rind, or huſk, correſponding to the ſecundines of the Fœtus, of animals, on the inſide whereof lies one or more, commonly two thick ſeminal leaves, anſwering to the placenta in Women and

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‡ Brooding. § Cavities.

the cotyledons in Brutes. Theſe Seed-leaves conſiſt of a great number of little veſiculæ or bladders with a tube correſponding to the navel-ſtring in animals, in theſe veſiculæ is received the moiſture of the Earth, ſtrained through the rind of the Seed, which makes a ſlight fermentation, with the proper Juice before contained therein. This fermented Liquor is conveyed by the umbilical * Veſſel to the trunk of the little Plant; and to the gem, or bud, which is contiguous thereto: Upon which a vegetation and increaſe of the parts ſucceed.

The procedure in the vegetation of a grain of Wheat is thus exemplified; the firſt Day the grain is ſowed it grows a little Turgid; or ſwelled, and the Secundine, or Huſk, gapes a little in ſeveral places, and the body of the Plant being continued by the umbelical Veſſel to a conglobated Leaf, which is called the Pulp, or Fleſh of the Seed; and is what conſtitutes the flower, ſwells, by which means the gem or ſprout, which is to be the future ſtem opens and waxes Green: The Roots begin to bunch out; whence the placenta

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* The Navel.

placenta or Seed-leaf, becoming looſe, gapes. The ſecond Day, the Secundine or Huſk being broke through, the ſtem, or top of the future Straw, on the outſide thereof, grows upward by degrees, the Seed-leaf guarding the Roots, becomes Turgid with its veſiculæ; and puts forth a white down. The Leaf being pulled away you ſee the Roots of the Plant bare; the future Buds, Leaves, and reſt of the ſtalk ſtill lying hid between the Roots and the aſcending ſtem, the trunk of the Plant is Knit, by the Navel-knot, to the flower Leaf, which is very moiſt, tho' it ſtill retains its white colour and its natural Taſte.

The third Day, the pulp of the conglobated, or round Leaf, becomes Turgid, with the Juice it has received from the Earth, fermenting with its own. Thus the Plant increaſing in bigneſs, and its bud or ſtem becoming taller, from whitiſh, it turns greeniſh, and pyramidical from the gaping Sheath, which adheres cloſely to the Plant and the lower root grows longer, and hairy, with many fibres, ſhooting out of it. Indeed

there

there are hairy fibres hanging all along on the roots, except on their tips, and theſe fibres are ſeen to wind about the ſaline particles of the ſoil, little lumps of Earth, *&c.* like Ivy; whence they grow curled about the Lateral-roots, there now alſo breaks out two other little ones. The fourth Day, the ſtem mounting upwards, makes a right angle with the ſeminal Leaf; the laſt Roots put forth more, and the other three growing larger, are cloathed with more hairs which ſtraitly embrace the lumps of Earth; and where they meet with any vacuity, unite into a kind of Net-work. The conglobate, or Flower-leaf is now ſofter, and, when bruiſed, yields a white ſweetiſh Juice, like Barley Cream. By ſtripping it off, the root and ſtem of the Plant are plainly ſeen, with the intermediate Navel-knot, whoſe outer part is ſolid, like a bark, and the inner more ſoft and medullary. † ---The fifth Day, the ſtalk ſtill riſing, puts forth a permanent or Stable-leaf, which is green, and folded; the Roots grow longer and there appears a new tumor of a future Root, the outer, or Sheath-leaf is loosſened and the Seed-leaf begins to fade.----The ſixth Day, the Stable-leaf being looſened, the Plant mounts upwards; the Sheath-leaf ſtill cleaving about it like a bark, the Seed-leaf is now ſeen ſinuous or wrinkled, and faded: And this being cut or freed from the ſecundine, the Fleſh, or pericarpium, is found of a different texture; the outer part, whereby the outſide of the Seed or grain is heaved up, being more ſolid; but the inſide veſicular, and filled with moiſture, eſpecially that part next the Navel-knot. All the Leaves being pulled off, the roots torn and the flower leaf removed, the trunk appears; wherein, not far from the roots, the Navel-knot bunches out, and is ſolid & hard to cut: Above there is the mark of the Sheath-leaf which was pulled off; and underneath, as in an Angle, the gem is often hid. The hind part of the Plant ſhews the breaking forth of the roots, and likewiſe the faded Placenta, *&c.* after the eleventh Day, the Seed-leaf, as yet ſticking to the Plant, and almoſt corrupted; within its hollow; and about the ſecundine, the mucous and white ſubſtance of the Seed, being continued to the Navel-knot, forms a cavity. All the roots now becoming longer, put forth new branches out of their ſides: The Seed-leaf withers, and its veſicles are emptied; the internodes, or ſpaces between the knots grow ſtronger; new gems appear, and the middle root grows ſeveral inches long.----After a month the roots and ſtalk being grown much longer, new buds break out at the firſt knot, and little tumors bunch out, which at length, break into roots.

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† Like Marrow.

It is obſervable, that the organized part of many Plants contain in them a number of inviſible ſeminal principles, capable of producing Plants like that to which they have owed their origin, of which many familiar inſtances are obvious proofs. The graft of a Tree for inſtance, from only one ſingle bud, produces a Tree, like that from which it was taken, the whole Tree being quite different from the ſtock on which it is grafted; but many Roots, even cut in ſmall bits, will each propagate its ſpecies, by producing the ſame Plant; or even the Eye of ſome Roots will furniſh perfect Plants, and Roots the ſame Year, as is ſeen in the Potato; cuttings from the branches of many kind of Trees, produce Roots and grow up to Trees of the ſame kinds, even the leaves of many ſorts, ſet in the Ground will grow, or no more than part of a leaf of ſome ſucculent Plants as the Opuntia, Indian Fig, &c. and how can this be, but by there having been ſeminal points in all theſe places & ſections; many inſtances of this kind might be given to prove that there are in almoſt all parts of Plants certain ſeminal points, which need only humidity and a proper degree of warmth, to develope and unfold themſelves into perfect Plants.

As to the Vegetable matter, or food whereby Plants grow, there is ſome doubt about it: the common opinion among naturaliſts, is, that Water is the great Vegetable food; which ſeems confirmed, by a ſprig of balm, or mint, or ſuch like Plant being ſet in a vial of pure Water without any mixture of Earth, yet the ſprig grows, and puts forth roots, leaves and branches, the ſame is obſervable in bulbous Roots, blowing in Water: Another experiment of *Van Helmont*, who drying two hundred pounds of Earth, and planting a Willow which weigh'd five pounds therein, watered it only with Rain Water, and to ſecure it from every other Earth, covered it with a perforated Tin-cover, at five Years end, weighing the Tree with all the leaves it had borne in the time; he found it to weigh one hundred & ſixty-nine pounds and upwards, yet the Earth was only diminiſhed two ounces. The reſult of other experiments, in order to give farther light, to many circumſtances of Vegetation, is, that the Water ſeems to aſcend up Plants, in much the ſame manner as up a filter, that the larger the Plant the more Water is required, that much the greater part of the fluid maſs, thus drawn off and conveyed into the Plants do not continue in them, but paſſes through their pores, and is drawn or exhaled up into the atmoſphere; and that Plants ſet in Water have expended Water, in proportion to the augmentation of the Plant in common, as fifty to one, & often as an hundred to one; ſo continual an emiſſion of Water, in ſo great plenty, from the parts of Plants, affords a manifeſt reaſon why Countrys that abound with Trees, and the larger Vegetables eſpecially, ſhould be very obnoxious to damps, great humidity in the Air, and more frequent Rains than others that are more open and free, and that Countrys abounding in Woods, and where Waters are much ſtagnated, are more unhealthful, as the humidity from Trees, Plants, *&c.* does not go off pure, and alone; but carries with it many parts, of the ſame nature, with thoſe of the Plant through which it paſſes conſiſt, that the finer and lighter parts only, are drawn up into the atmoſphere afterwards, thence they are conveyed to our organs of ſmell, by the Air we draw in reſpiration, and are pleaſant, or offenſive, beneficent or injurious to us according to the nature of the Plants from which they ariſe, and that a greater quantity of odours is found exhaling from Vegetables in warm humid ſeaſons than in any other. We learn alſo that great part of the Terreſtrial and Vegetable matter that is mixt with Water, aſcends up into the Plant with it; and ſo fine are the component parts that neither by filtering or any other method can it be wholly diſcharged from the Water, and that there are many Plants which with the Vegetable matter, take up the mineral alſo, as appears from many marine Plants, from which kelp, pot-aſh and other fixt ſalts are drawn-----It is certain that nitre and other ſalts looſen the Earth, and ſeperate the concreted parts thereof, by that means fitting and diſpoſing them to be aſſumed by Water, and carried up into the Seed or Plant for its formation and increaſe. It is every Perſons obſervation, how apt all ſorts of ſalts, are to be wrought upon by moiſture, how eaſily they run with it; and when theſe are drawn off, and have deſerted the lumps wherewith they are incorporated; they moulder immediately, and fall aſunder of courſe. The hardeſt ſtone we meet with if it happen, ( as it frequently doth ) to have any ſalt intermixt with the ſand of which it conſiſts, upon its being expoſed to a humid Air, in a ſhort time, diſſolves and crumbles all to pieces, and much more will clodded Earth or Clay; which is not of ſo compact and ſolid a conſtitution. The ſame way is Lime likewiſe ſervicable in Vegetation; the Huſbandmen ſay it does not fatten, but only mellows the Ground: By which they mean it does not contain any thing in itſelf, that is of the ſame nature with Vegetable mold, or affords any matter fit for the formation of Plants, but merely ſoftens and relaxes the Earth; by that means rendering it more capable of entering or being actuated by the Seeds of Vegetables ſet in it, in order to their nouriſhment, than otherwiſe it would have been. The properties of Lime are well known, and how apt it is to be put in a ferment and commotion by Water; nor can ſuch commotion ever happen, when Lime is mixt with Earth, without opening and looſening it. All Vegetable matter is not proper for the nouriſhment of every Plant, nor does there want good indications, that every kind of Vegetable requires a peculiar and ſpecific matter for its formation and nouriſhment; nay, each part of the ſame Vegetable; and that there are many and different ingredients go to the compoſition of the ſame individual Plant. If therefore, the ſoil where any Vegetable or Seed is planted, contains all, or moſt of theſe ingredients and thoſe in due quantity;

it will grow and thrive there; otherwiſe it will not, if there be not as many ſorts of corpuſcles, or minute particles, as are requiſite for the main, and more eſſential parts of the Plant, it will not proſper at all, if there are theſe, and not in ſufficient plenty, it will never arrive to its natural ſtature, or if there be any, of the leſs neceſſary and eſſential corpuſcles wanting, there will be ſome failure in the Plant, and it will be defective, either in taſte, ſmell, colour or ſome other way. The differing parts in Vegetables are very unaccountable, that one ſhould carry a reſinous, another a milky, a third a yellow, a fourth a red juice in its veins, and one afford a fragrant, another an offenſive ſmell, one be ſweet to the taſte, another acid, bitter, *&c.* that one ſhould be nouriſhing, another poiſonous, one purging, another aſtringent, and this argument makes equally ſtrong againſt thoſe, who ſuppoſe mere Water the matter out of which all bodies are formed. Farther proof is, that the ſoil once proper for the production of ſome ſort of Vegetables does not always continue to be ſo, but, in a tract of time, looſes its property, by too often repeating the ſame crop, and this ſooner in ſome Lands than in others: The Land being worn out, will not revive to bear the ſame Vegetables, till it is ſupplied with a new fund of matter of the like ſort, with what it firſt contained, either by the Grounds lying fallow ſome time, till the Rain has poured a freſh ſtock upon it, or by manuring it.----The like is obſervable in Gardens, & Orchards, where the Trees, Shrubs & Herbs after their continuing in one ſtation, till they have drawn thence the greater part of the matter, fit for their increaſe, will decay and degenerate, unleſs either freſh Earth or ſome fit manure be applyed to them; it is true they may maintain themſelves there for ſome time, by ſending forth Roots farther and farther, to an extent all around, to fetch in more proviſion, but at laſt, they muſt have a freſh ſupply brought to them, or they themſelves muſt be removed or trans-planted, to ſome place better furniſhed with matter for their ſubſiſtence; and accordingly Gardeners obſerve that Plants that have ſtood a long while in a place, have longer Roots than uſual, part of which they cut off; when they tranſplant to a freſh ſoil, as not of now any father uſe to them. All theſe inſtances point out a peculiar terreſtrial matter as the ſubject to which Plants owe their increaſe; were it Water only there would be no need of manures, or of tranſplanting, the Rain falls in all places; in this Field and in that, indifferently, and on one ſide of a Garden, or Orchard as well as another, nor could there be any reaſon, why a tract of Land ſhould yield Wheat one Year, and not the next, ſince the Rain ſhowers down alike on each. Water ſerves only for a vehicle to the terreſtrial matter, which ſupports Vegetables, and does not itſelf make any addition to them; it is not the matter that compoſes Vegetable bodies; it is only the agent that conveys that matter to them, and deſtributes it to their ſeveral parts for their nouriſhment; nor is water capable of performing this office to Plants, unleſs aſſiſted by a due quantity of heat; this muſt concur, or Vegetation will not ſucceed. It is plain, Water has no power of moving itſelf, or riſing to the vaſt height it does, in the more tall and lofty Plants, it is true alſo, the parts of Fire and heat are not capable of moving themſelves any more than thoſe of Water; but they are more ſubtile, light, and active than thoſe are, and ſo are more eaſily put in motion. That the concurrence of Heat in this Work is really neceſſary, appears not only from remarks already made, but from all nature, from the Fields, and Foreſts, Gardens and Orchards; we ſee in *Autumn*, as the Sun's power is gradually leſs and leſs, ſo its effect on Plants is weakened, and Vegetation ſlackens by little and little. Its failure is firſt diſcernable in Trees, which being raiſed higheſt above the Earth, require a more intenſe Heat, to elevate the Water, charged with nouriſhment to their tops; ſo that for want of freſh ſupport, and nutriment, they ſhed their leaves; unleſs ſecured by a firm and hard conſtitution indeed, as our evergreens are. Next, the Shrubs, part with their leaves, and then the Herbs and lower tribes; the Heat being at length not ſufficient to ſupply even theſe, though ſo near the Earth, with the fund of their nouriſhment. As the Heat returns the ſucceeding Spring, they all recruit again, and are furniſhed with freſh ſupplies and verdure: but firſt thoſe that are loweſt and neareſt the Earth, and that require a leſſer degree of Heat to raiſe the Water with its earthy change into them; then the Shrubs and high Vegetables, in their turns, and laſtly, the Trees. As the Heat increaſes, it grows too powerful, and hurries the matter with too great rapidity, thro' the finer and more tender Plants, theſe therefore go off, and decay, and others that are more hardy and vigorous, and require a greater degree of Heat, ſucceed in their order; by which mechaniſm provident nature furniſhes us with a very various and pleaſing entertainment; and what is beſt ſuited to every Seaſon of the Year.

The Clouds which are precipitated in rain-drops for the ſervice of mankind, do not conſiſt wholly of watery particles, for beſides the aqueous vapours, and what theſe contain, there are raiſed from the outward part of the Earth, into the Air ſulphurous and ſaline particles, which are alſo carried into the clouds, and mixed with the aqueous vapours. Here we have a mixture of all the ſmall ſubſtances, as it were, in their extreamly ſmall parts; floating in the Air together, and the effects of theſe ſulphurous and ſaline particles, thus mingled with aqueous vapours, are ſometimes very ſenſibly perceived, particularly in Thunder and Lightening, when the ſulphurous and nitrous particles, taking fire, by the motion ariſing from heat, break out with violent flaſhes, and noiſe, very much reſembling the effects of Gunpowder; or rather, as the effect is the ſame in both inſtances, ſo muſt the cauſe be; ſince it is plain that there is a vaſt quantity of nitrous, ſulphurous, and bituminous matter all over the ſurface of the Earth, and that Plants and Animals abound with volatile Salts; we need not wonder that the Sun fills the Air with ſuch fine particles (and all ſorts of unctuous exhalations) by firſt expanding and then exhaling them till they meet with Air, and other mixtures of the ſame ſpecific gravity.----What are uſually called *Ignus Fatuus*, or *Jack* with a *Lanthorn*, ſeem to conſiſt of a more unctuous ſubſtance than other exhalations; for we find their oily particles are eaſily fired,

but

but not ſo ſoon ſpent as thoſe of ſulphur, and nitre. Shooting-ſtars are improperly ſo called, becauſe they are nothing more than exhalations kindled in the Air; if a long train of theſe ſubſtances take fire at once, it is commonly called a dart, ſometimes a Fire-ball, if there be many and they continue in the ſame Place, they are then called Beams. Thus we plainly ſee, how full the Air is of theſe rich ingredients, for the buſineſs of vegetation: And becauſe they are of ſuch conſequence to the growth of Plants, we will enumerate the ſources of them upon the frame of the Globe; from whence the Sun and wind borrow them, in order to diſperſe them properly in the Air, that they may intimately mix and deſcend with the Rain-drops, by which they are thus conveyed to the mouths of the fibrous tubes of Plants, with the greateſt care and ſkill; and theſe ingredients, firſt leaving the ſurface of the Earth, through the whole proceſs of their various motions, configurations, and combinations; are prepared in the moſt exquiſite manner, to be received into the bowels of Vegetables, which we plainly ſee ſtand in great need of them: As without their friendly aſſiſtance or ſome compoſitions of dung to reſemble them, they are not able, from Earth and Water alone to arrive at maturity. Salts are of various kinds---but all have a ſharp pungent taſte, though not all alike, ſome are dug out of the Earth like Stone out of a Quarry, others made from Sea-water, others from ſprings of Brine, and prepared by Fire for the uſe of Man.----The Salt in all theſe caſes, is the ſame as to the nature of it, whether it be produced by art, or is the product of the Quarries; for the ſaline particles are not made by art, in the combination of ingredients to imitate it, but are only ſeperated from the watery Particles, wherein they floated.---- The qualities of this excellent ingredient in Vegetation are, that it is eaſily diſſolved, and melts in the open Air, if it be refined from all heterogeneous Matter; when the Water wherewith it is entangled is any ways drawn off, there is a groſs ſediment remains, (but the finer parts are carried away with it), and is the only thing the Fire cannot melt, but reduces it to a Calx. This facility, of the finer parts ſwimming, as they are ſpecifically lighter, than Water, contributes to the benefit of Plants; they intimately mix with it and are carried in thoſe vapours through all the neceſſary ſtages, till they return to the Earth again. This quality of melting or diſſolving, in Water and Air, ſets the finer parts at Liberty and prepares them to take Wing with the common exhalations; and yet, the ſediments or groſſer parts which are left behind, have their excellent uſes, in helping the embrios of Plants to ſend out their fibrous Tubes, in ſearch after more refined particles; which either adhere to the ſuperficies of the particles of Earth, or are contained in their internal pores.

Nitre, of which there are ſeveral ſorts, natural and artificial, the former refining itſelf and the latter refined by Art, is a kind of Salt and differs from Sea-ſalt, only in being more Acid, and lighter and eaſily taking Fire; but, like it, is reducable to a Calx. The vapours or particles of Nitre, when they deſcend for the uſe of Plants, are found to contain abundance of Spirits; for the Nitre as a Salt, is impregnated with them; which renders it volatile, and the Fluid extracted from it is very ſharp and corroſive----The Calx to which Nitre is re-reducible, as well as the Calx of common Salt, has its excellent uſe in Vegetation; and when it is reduced by Fire to this ſtate, it then takes the name of fixed Salt, or rather the aſhes of Salt. The benefit of this calcination to Land is manifeſt from the aſhes of Burnt vegetables and other natural bodies reducible to a calx; for the rich principles or food (if we may ſo call it) of vegetables, are contained more or leſs in all bodies, whoſe parts can be thus ſeperated, as is evident from the operations in Chymiſtry, which reduces bodies to their component parts, or elements, by the help of fire. ------ Sulphur, is a liquid clammy ſubſtance, whoſe parts are ſoon ſeperated, and riſe up into the air with other vapours; and theſe ſoon occaſion violent motions in the atmoſphere, & become entombed in the aqueous particles, and are with the rain brought to the plants.

Bitumen, is pretty much of the ſame nature with ſulphur, and with it is found in great plenty, in moſt bodies, but in the moſt remarkable manner, or in the greateſt quantities, in Pit Coal: Yet not in equal quantities, as ſome are more full of it, & burn much better than others, and ſome have more ſulphur in them as is diſtinguiſhed by the ſmell.----Naphtha, is a kind of bitumen, and the only difference is, it ſooner takes Fire, than bitumen is obſerved to do, and is not ſo eaſily quenched, this facility of admitting the heating particles, which throw thoſe inflamatory bodies into a ſpeedy motion internally, is of great uſe in the different degrees of the Plants growth. Maltha, ſeems to be a ſpecies of the naphtha, its properties as they appear to common obſervation are, that if it touches any thing, it ſticks ſo faſt to it as not eaſily to be ſeperated; and Water thrown upon it in moderate quantities does but the more inflame it, and Earth alone is found proper to quench it. This valuable ingredient when it deſcends in the drops of Rain, adheres very intimately to the internal parts of the ſoil; both on the ſuperficies, and the concave part of pores; and other deſcents of Rain increaſe the motion of the internal parts of the particles of Maltha, and thereby promote a fine dilatation* in the tubular interſtices, of the fibres of Plants, & duly contribute to the accelleration of that motion in them, which is neceſſary to the different ſtages of their growth and nouriſhment. Before the fine parts of the maltha are in readineſs, or duly prepared by moiſture, by their well regulated fermentation, and while it is waiting for the deſcent of more Rain, it is diveſted of all internal motion; and confined as a Priſoner, as it were, till the other requiſites for the Plants welfare are properly aſſembled, and ready to perform their offices. Theſe are the chief materials which give motion to Plants; and of which the latter are found to conſiſt; when by chymiſtry they are analyzed, unfolded, or ſeperated, into their component parts, that is, when the heterogeneous parts are not only diſcovered, but ſet a part, and each quantity eſtimated and proportioned to the bulk of the whole Plant, Theſe Artiſts call volatile ſpirits, ſulphur, and ſaline par-

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* Expanding, wanting more room.

ticles, the active principles; but Water and Earth they call unactive principles, the active principles, by their continual motion, cauſe the whole action, or, to ſpeak more properly, are the ſole agents, when duly prepared, and exactly applied to the mouths of the fibres; the other two, the unactive principles, being ſeemingly of no other uſe, than to bring them, and to help forwards in making them ready for the Plants. Theſe upon every occaſion, ſuitable to their natures, ſtop the too frequent ſallies, and impetuoſity of the active principles, from the mouths of Plants, by a juſt regulation of the attractive and repulſive virtues; which are beautifully eſtabliſhed between the active and unactive principles. The one upon occaſion, giving motion, and the other, by re-action retarding motion; ſo that the nutritive principles may have a given motion, ſuch as the reſpective Vegetables require.

The vapours thus raiſed from the ſurface of the Earth, in the manner already deſcribed become the original matter of all meteors, or heterogeneous ſubſtance, fit for the production of the Vegetable world, and conſequently are inſtruments in the wiſe appointment of divine providence for the preſervation of Man, and all ſubordinate Animals. When theſe heterogeneous vapours, are thus lifted up above the Earth, one degree of Cold condenſes them into large globules, which, becoming ſpecifically heavier than the atmoſphere, fall in drops of Rain, and bring down all thoſe treaſures incloſed in them. A greater degree of Cold produces a fixedneſs, or co-agulation of the heterogeneous vapours, which ſhoot like Salt into various curious forms, or branchings out; united into certain angles, and make the flakes of Snow, which ſtill contain the nutritive principles. A third and ſtill greater degree of Cold combines the vapours into a harder ſubſtance, and intombs the valuable ingredients, and they deſcend in what we call Hail; but if the Cold condenſes the vapours before they riſe high above the ſurface of the Earth, they will then be unable to aſcend, but will hover about, and fill the lower part of the atmoſphere with what is uſually called a Fog or Miſt, and if the Cold be ſtill more intenſe, the Miſt is frozen to every twig and blade of Graſs in form of a white incruſtation, which is called a Rime. When the Air in a fine Day is Warm, and the vapours buoyed up in it are too fine to be viſible in the Day time, they will yet be condenſed by the coolneſs of the Evening, deſcend and ſettle on the Vegetables in the form of Dew, and if the Evening of ſuch a fine Day is Cold enough to freeze, then inſtead of Dew, the ſurface of the Ground will be covered with what is commonly called a white or hoar Froſt.

Theſe are the various ways which are appointed to bring down again upon the Earth the treaſures that were taken up from it in order to be prepared and properly ſpread over the Globe, in methods and contrivances no leſs beautiful than wonderful, and all this for the ſupply of needy Man; who when theſe bleſſings are held from him for a conſiderable time, is doomed to deſtruction. But among the riches of the atmoſphere, for the production of Vegetables, we muſt not omit to mention the conſequence which Air itſelf is of to them, even in their own Bowels; beſides the manifold uſes of it in buoying up their nutritive principles till they are ready for precipitation, and to be applied to the mouths of their fibres. That Plants contain a great quantity of Air in their ſmall veſſels, is evinced beyond any ſort of doubt, by experiment made to extract it from their inward parts; and fermentation in the parts of Plants depends upon the agency of the Air; for when they are placed under an exhauſted receiver, that motion is at a ſtand, & Vegetation thereby ſtopt. In this inſtance we ſee how abſolutely neceſſary Air is in the production & growth of Plants, & indeed this ſubtle agent is conveyed into the internal veſſels of the Plant, with the juices, through little & almoſt imperceptible tubes & from the top through the bark, or outward covering, returns again to the root & indicates a circulation of the Air & vital liquor, like the circulation of the Blood in Animals. From the whole we muſt conclude, the Air to be as neceſſary to Plants as any part of their nouriſhment, for they may as well want one as the other, nay, it ſeems from many inſtances, that they will live longer without Food than without Air. From theſe & many other proofs we may plainly ſee, that unleſs the Air was preſerved in its preſent condition, and its due balance maintained, the Vegetable World muſt inevitably be deſtroyed; and not only Vegetables but Mankind and Animals alſo. The Air being every inſtant, in its well regulated appointment, neceſſary to their exiſtence. The Vegetative principle is very extenſive, and ſeems differently ſeated in different Plants, many think that generally it is fixed between the trunk and the root: At leaſt this appears to be the place in moſt of the ſemniferous, or Seed tribe; which if cut down near the place, rarely ſhoot again. In other Plants, as the Elm, and many edible, or eatable Plants it ſeems to reſide wholly in the roots: Which if cut into ever ſo many parts, yet thoſe being planted in the ground ſoon grow, in others as in the willow kinds it ſeems to be diffuſed all over, roots, trunk, and branches, inſomuch, that if cut into a thouſand pieces there is no deſtroying them, without ſplitting them in the middle, and ſcarcely then. Laſtly, in others as the Cereus's, Ficus's, *&c.* it is ſeated in the body, branches, and leaves; any of which being put in the ground, ſtrike root immediately and grow. The office of this Vegetative principle, is, to concoct, the undigeſted Earth and Salts, which aſcend through the roots, and aſſimulate them to the nature of the Plant.

I have now gone as far in deſcribing the nature and effects of Vegetation, as the limits of my preſent publication will allow. The application ſo far as relates to Huſbandry, depends on a right knowledge of ſoils, and how to prepare them in a proper manner, to receive the greateſt benefit from nutriment conveyed from the atmoſphere, and various manures, neceſſary to promote the growth of uſeful Roots, Plants, Grain, *&c.* inſtead of Weeds or Barrenneſs. It is obſerved that frequent ſtirring of Soil by fallow in a common courſe of Huſbandry, is very beneficial; by rendering it ſuſceptible of the ſaline and other particles neceſſary to its improvement; and it is certain, the finer you render the ſoil, the more capable it is of admitting their Vegetative aſſiſtance; large clods or lumps of Earth, are long in receiving the benefits ariſing from fermentation, their interior parts being hardened by the Heat of the Sun prevent the Rain from penetrating far into them, or at leaſt not ſoon; if the lumps are very large, they only moulder off and flake by little and little, and the Seeds of Weeds contained in them do not receive moiſture ſufficient to make them ſtrike root, in order to their being plowed under and deſtroyed by the next ſtirring; by thus remaining in an inactive ſtate, till ſet at liberty by ſufficient quantity of moiſture, they hereafter come up and foul the crop. Whereas by pulverizing the ſoil, the Weeds grow immediately, and being plowed under, the fermentation cauſed by their putrifaction helps the crop. Fermentation being found one principal means of promoting Vegetation, and the more fermenting principles are collected together become the more extenſively uſeful, ſome being neceſſary Food for one kind of Plant, ſome to another, and to ſome kinds all, or the greateſt part, are neceſſary.

How the different parts accrete to bring on Fermentation, or cauſe the Inteſtine motion excited in Vegetables, or how the different ſubſtances may be extracted by atmoſpherical Heat, or chemical operations, is not for me abſolutely to determine; and it would be kind in any Perſon or Perſons, more able, to explain theſe and many other things in natural Phyloſophy equally uſeful for promoting and improving the Syſtem of Agriculture on rational principles. However, I will attempt to deſcribe a few uſeful phænomena for inſpection, at leaſt in the manner they appear to me. Salts, nitre, and ſulphur, are ingredients whoſe properties and uſes have been frequently deſcribed by various *Authors*, and their effects more generally known. But the properties of bitumen, naphtha and maltha, are known to very few, nay their very names are unknown to the generality of Huſbandmen. They are three real ſubſtances, found in great abundance in ſome parts of the World, and ſeem diſperſed all over the Globe, in greater or leſſer quantities. Bitumen, is a mineral Foſſil, not diſſolvable in Water, is a combuſtible oily matter, which in ſubſtance appears like Pitch, or black Wax, and eaſily takes Fire. Naptha, is a mineral fluid of a more inflamable nature than bitumen, is found in many Countries, is an oily ſubſtance, both ſulphury and clammy, when pure, is uſed in Lamps inſtead of oil, is eſteemed better, being more durable, not ſo eaſily extinguiſhed, and leaves no reſiduum; ſome Perſons take it to be the original cauſe of the accretion of amber, from other minerals, or what gives that peculiar ſmell to amber different to any other ſtone. Maltha is a foſſil which in ſubſtance appears much like bitumen, the *Aſiatics* very commonly Plaſter their Houſes with it, is very durable, but attended with one ill quality; namely, that if it takes Fire, Water will not quench it, but makes it burn more fierce; it is ſaid Earth is the only thing to extinguiſh it. Although the properties of theſe different bodies are not generally known, yet it is very certain that theſe are the heating and inflamable qualities peculiar to them, contained in Earth or its component parts more or leſs as will appear in the following inſtances. If you ſtand by a *Smith's* Forge while he is blowing up his Fire, you may obſerve him ſprinkle it plentifully with Water, in order to make it burn more furiouſly, and thereby increaſe the heat; there muſt be ſome property, or quality in the Coals, that Water thus operates upon, you will ſee the Sulphurous parts ſhew themſelves by burning blue, and are eaſily extinguiſhed by Water, the nitrous particles crack and fly off immediately, agreeably to the known nature of Nitre. The Bitumen contained in them gives them the conſtant heat; but Maltha ſeems to be the cauſe of the increaſing heat, when Water is thrown upon them, as it always produces that effect.

Another inſtance may be given in Lime-ſtone; we know not perfectly how Lime-ſtone accretes or is compoſed by Nature; that there are ſome properties in it that give it a firmer texture than Free-ſtone, and different from Coals is certain, as Fire doth not conſume it; in reducing it to a Calx, if Sulphur is contained in it, it is known by its burning blue, and having a Sulphury Smell, if Nitre, by its cracking and flying to pieces as ſoon as the heat of the Fire reaches it; but it likewiſe plainly appears, that certain particles of inflamable Matter are contained in it, which Fire alone doth not conſume, or remove; for after being thoroughly cold, even after a conſiderable length of Time when cold Water is thrown upon it, it immediately takes Fire, ſlakes and crumbles to Powder; what is ſo likely to produce ſuch an effect as Maltha? Which hath this inflamatory quality, principle, or power in it, different from all other Minerals.

Theſe two inſtances I introduce, in order to give the Reader ſome Idea of the nature and qualities of the Vegetating Powers before-mentioned, and the effects they produce when acted upon by either Fire or Water; made level to the Capacity, Knowledge, or Obſervation of every thinking Perſon in common Life. From this Obſervation, ſomething may be diſcerned, of the nature and cauſe, of the Inteſtine, or inward motion, excited in Vegetables by the combination of different Principles.— You ſee how ſuddenly a cold piece of

Lime-ſtone takes Fire, and diſcharges both its Air and Heat, only by having Cold Water thrown upon it, the manner in which this acts is very clearly perceived by every one who ſees it, though both its cauſe and nature, have hitherto been hid; we are naturally led to conclude, that when the ſame Ingredients meet in Plants, Trees, or Soils, they muſt certainly cauſe ſuch-like Fermentation and effect. I am rather of opinion that all Stones grow, are generated, or concrete in the Earth, by means of the various Subſtances before-mentioned in continuation with Water, and other unctuous or oily Bodies (the principal of which I take to be Naphtha) contained therein, which being filtered through the different Strata's of it, happening to meet with ſome obſtruction, cauſed by ſubſtances they cannot paſs, there unite, and compoſe thoſe ſubſtances we call Stone, of different kinds. As to Coal, where it is found, there are in general a number of different Earths or Rocks above it, in certain Strata's, which plainly indicate there are many igneous combuſtible ingredients contained in them, which paſſing through thoſe Strata's, and meeting with Sulphur, Bitumen, Maltha and other particles, which have been ſtrained or filtered through their different Strata's, and uniting in one body, form that ſubſtance commonly called Pit-Coal.

But theſe conſiderations being foreign to my preſent deſign, I ſhall here break off the ſubject as being of too extenſive a nature, for my Plan. I am in hopes many will meet with both *Entertainment* and *Advantage*, from the peruſal of the *foregoing Work*, and that it may prove acceptable to my *Readers* in *General*.

I. N.

*FINIS.*

# INDEX.

A.

Page.

ANNATTO - 63
Arſmart — 113
Appletree — 121, 132

B.

Bulged Cheeſe — 54
Bliſtered Ditto — 35
Blue-pared — 51, 81
Brine-drippings — 43
Bull Cheeſe —— 44
Breaking-curd 48, 84, 87
Bitter Cheeſe —— 90
Breeders of Cows -- 97
Butter —— 108
Butterflies — 127
Brick-bat Cheeſe -- 59
Blights —— 135
Bitumen — 166, 175

C.

Curd —— 14, 89
Cow deſcribed — 17
Curdly Cheeſe — 55

Page.

Cream Cheeſe -- 58, 60
Colouring Cheeſe 62, 67
Cheeſe from poorland 83
—— from Clover -- 89
—— from any Land 83
Cheeſe-Chamber -- 100
Cheeſe-Preſs — 88
Cheeſe-Vats —— 103
Centaury —— 114
Cow-Bane — 116
Cow-Weed —— 117
Crab-Trees — 124
Chryſalis —— 127
Caterpillars —— 127
Chill-Cheeſe — 31, 60
Cochineal —— 68
Correſpondent's Letter —— 85
Clouds — 160

D.

Dry Cracks, 11, 55, 80
Dairy-woman, 12, 15, 68
Dairying —— 16
Dairy Ground — 25
Drop-Wort — 118

E.

Page.
Eyes in Cheeſe 11, 32

F.

Fermentation -- 33, 174
Fixt Air, 33, 34, 52, 89
Foul Air —— 52
Flavour —— 72
Froſt — 60, 88, 101
Flakey Cheeſe — 62

G.

General Quantity of Cheeſe —— 21, 23
Green Whey — 50
Gooſberry and Currant-Trees — 134
Great Grub — 137

H.

Hove Cheeſe --- 34, 52
Huſky-Coated — 11
Harſh Air —— 53
Hemlock —— 114
Henbane —— 115
Honey-dews —— 136
Honeycomb Cheeſe 33

J.

Jointed Cheeſe 51, 81

Page.
Inſects —— 130

K.

Kex —— 117

L.

Looſe Cheeſe -- 33, 35
Lime —— 155
Lime-Stone —— 177

M.

Milk — 17, 18, 93
—— carried in Churns —— —— 26, 80
Milk-warm —— 28
Maw-ſkin --- 36, 41, 43
—— way to make them 42
Marigold Cheeſe — 67
Meadow Sweet — 114
Mithridate —— 118
Moſs — 126, 128, 135
Maltha — 166, 176
Manure —— 132

N.

Noxious Plants - 91, 94
Night-ſhade —— 115
Nitre —— 164
Naphtha — 166, 176

P.

P.

Page.
Parſley Cheeſe — 67
Poiſonous Plants 82, 90
Paſturage ---- 13, 91
Penny-Wort — 118

Q.

Quantity of Cheeſe from the ſame Milk —— 8, 85, 76
Quantity of Cheeſe made — 22, 45, 65

R.

Rank Cheeſe -- 11, 52, 53, 86
Rotten Cheeſe — 51
Rendling Milk 27, 33, 42, 77
Running Streams — 98
Runnet Plant - 103, 119
Rib-wort —— 113
Runnet, to make 43, 50

S.

Sweet Cheeſe --- 49, 73
Spongy Cheeſe — 52
Split Cheeſe —— 53
Salting in Milk 28, 30, 54
Salting in Curd — 53
Slip-curd -- 31, 35, 47, 57, 61
Sunk Cheeſe -- 46, 84

Page.
Sunk-coated Cheeſe 55
Skimmed Cheeſe 56, 61
Sage Cheeſe —— 67
Salutary Plants — 94
Saintfoin Graſs — 95
Scalding Cheeſe --- 101
Slip-coat Cheeſe 58, 61
Sulphur —— 165
Salts — — 163

T.

Time in earning 14, 31, 45, —— —— 48, 58
Tears — — 32
Two-meal Cheeſe -- 56
Turnips — — 137

V.

Vegetation -- 139, 143
Vegetable --- 140, 142
Vegetable-matter -- 151, 155
Volatile Spirits — 167
Vegetative principle 172

W.

Whey Springs -- 11, 32
Warmth of Milk 28, 29
Warming Milk — 31
Water-wort —— 117
Warmth — 61, 98
Waſhing Cheeſe -- 100
White Whey — 49

# ERRATA.

Page 23, line 5, the Parentheſis) to be placed, after expoſed to)

Page 43, 10 lines from the bottom, read quite.

Page 59, 2d line, between-hard, coming—deſtroy the Comma.

Page 60, laſt line, read will looſe.

Page 69, 5 lines from the bottom, read may wiſh to have.

Page 72, 17th line, after uſefulneſs, put a Comma.

Page 78, 5th line, read quite—ibid, 3d line from the bottom, read quite.

Page 80, 4th line from the bottom, read marbled.

Page 118, 11th line, read Penny-creſs.

Page 126, 7th line, read topping.

Page 131, 6 lines from the bottom, inſtead of on their Ova's, read, or their Ova's.

Page 132, 6 lines from the bottom, read Plants.

Page 89, 11th line, for in, read it.

Page 110, 7th line, for preceives, read perceives.